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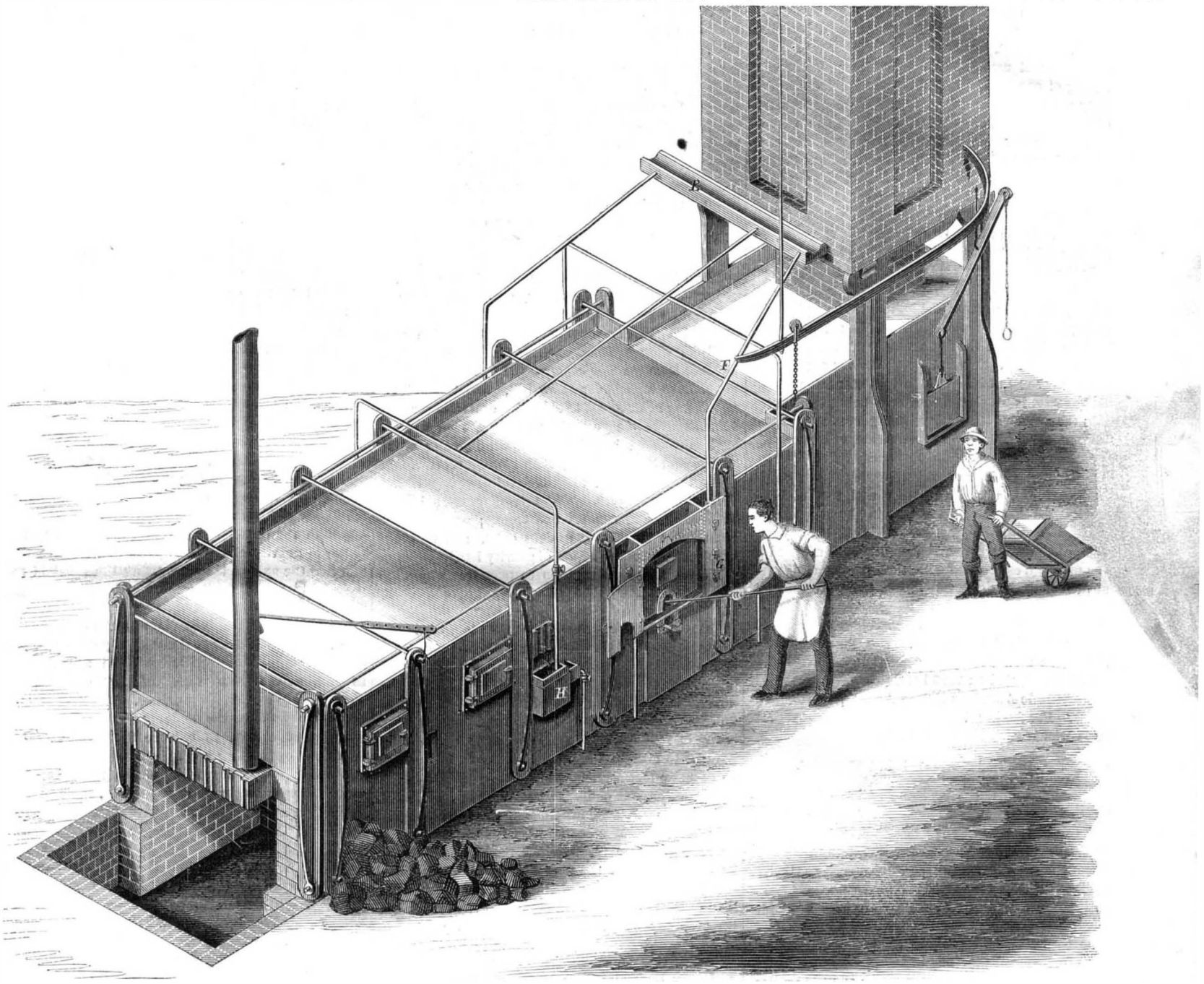
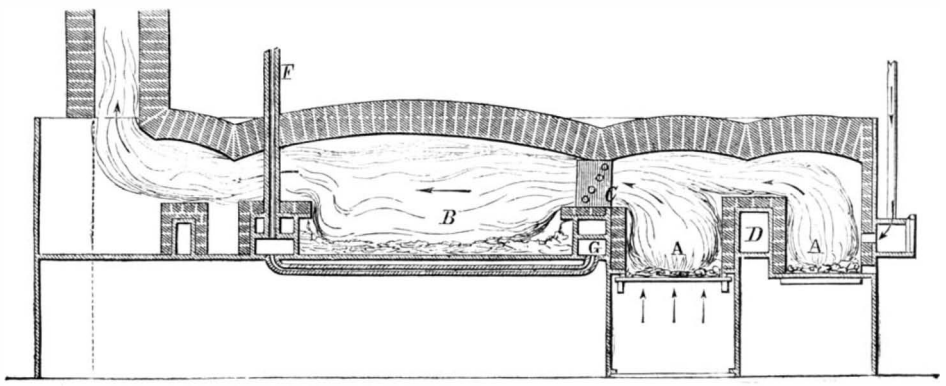


Improved Furnace.

Doubtless many persons have wondered how cast iron was converted into wrought iron—how, from being brittle and crystallined in structure, it was changed into a tough and fibrous material. The process is very simple and is thus carried on: A quantity of pig iron is melted in a furnace fitted with apertures to admit stout iron bars. When the iron is thoroughly fused a workman takes one of these rods in hand, as shown in the engraving, inserts it through an opening, and works the melted iron back and forth until it assumes the shape of a ball. This occupies considerable time, and is very severe labor, both on account of the heat radiated from the furnace and rom the weight and nature of the work. A ball of one hundred pounds is about as heavy as can be handled efficiently.



WILLIAMS'S FURNACE FOR PUDDLING IRON.

The ball having been thus rolled up is hauled to the front of the furnace and hoisted out; it is then put on a truck and carried to a machine called a "squeezer," which flattens it out into what is called a bloom. It is then reheated in another furnace, and is finally rolled or hammered into bars or rods of any shape.

And that is the way cast iron is converted into wrought iron. In fact the operation resembles butter-making in its manipulation, as much as any process all are familiar with. If a quantity of cream were tossed about until the butter formed, we should have a puddled ball of butter, and the buttermilk would be represented (in the process of making wrought iron from cast) by a pile of cinders and melted silex or "slag," as it is called—that being the refuse worked out from the pig iron. In ordinary puddling furnaces the chimney stack is the hottest part. The fuel is burnt at a great disadvantage

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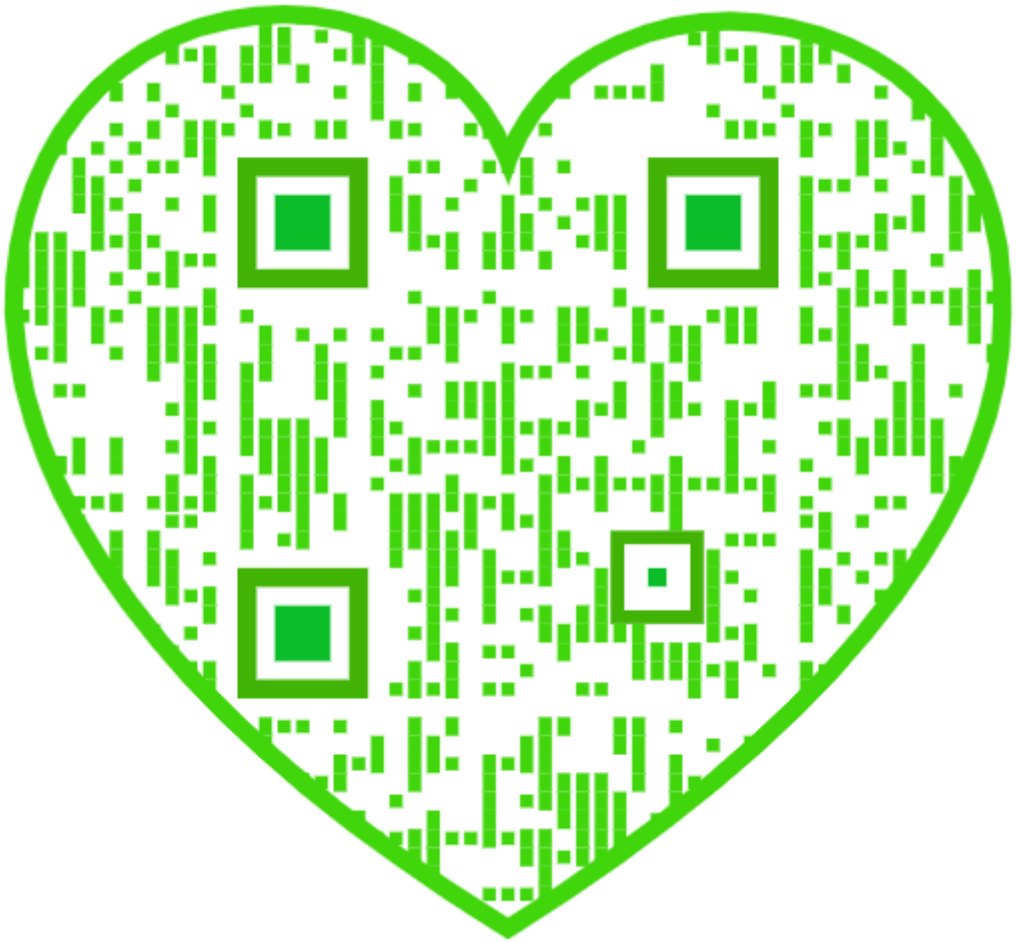

resulting in enormous waste and adding greatly to the cost of production.

The invention represented in this engraving is intended to obviate these objections by consuming the gases and products of combustion, generally, in the furnace where the iron is melted and puddled, and not in the chimney where no useful effect is gained from it.

Fig. 2 shows how this object is obtained. A grate, A, is provided at the end and a fire built upon it; from here the heat, smoke, and gases pass over into a larger chamber, B, where the iron to be melted is laid. The products of combustion, in passing over the bridge wall, C, are met by a blast of air which, together with the temperature gradually obtained in the chamber, results in much better combustion than usual. So great, in fact, that with the same kind of iron and coal used in this and in other furnaces, a saving of one-fourth the fuel is obtained and nearly forty per cent in ore for "fixing," yielding more iron of a better quality in a shorter time. The cost of this furnace is about the same as an ordinary one.

In order to facilitate the process of melting the pig and economize fuel as far as possible, the pig iron, before being put in the chamber where it is finally melted, is charged into a muffle, at D, which heats it very hot. From this it is subsequently removed, as before explained.

In the perspective view there is a trough, E, shown attached to the chimney. This is only a section of a length running across the building. The pipes, F] going from it enter water boshes, G, set about the jambs and sides of the furnace to prevent them from being burnt out. These water boshes are open at the ends, as shown at H, so that all danger from generating steam is obviated, the same being discharged into the open air instead of being confined, or, at best, so set as to require watchfulness, as is generally the case.

This furnace is now in successful operation at Montreal, C. E., and the wear and tear of brick work is far less than is common in the old plans.

The inventor is a practical puddler of many years' experience, and states that the furnace is adapted to the use of Western coal with blast, and an additional advantage is the construction of the water boshes. These are economical where "hot fixing" is used, as it generally is at the West. The engraving represents a double furnace, but it can be applied to a single one as well.

It was patented on the 3d of October, 1865, through the Scientific American Patent Agency, by John Williams. For further information address him at Victoria Iron Works, Montreal, C. E.

COUNTER-WEIGHTING MACHINERY.

The value of balance weights in all cases where rotating machinery runs at high speeds is so generally recognized in the present day that it may appear superfluous to add a word to the chapters which have already been written on the subject. Nevertheless there is hardly a question connected with their application in practice which does not still form a subject for discussion, and many mechanicians even now dispute the necessity for their use, fail to understand the principles on which their value depends, or apply them in such a way that they prove of little service. A short explanation of the theory of their action will therefore not be out of place here, and we shall endeavor to place the subject before our readers divested of those mathematical formulas for which practical men have so little liking. It is fortunate that the theory is so simple that this object may be easily carried out without detracting materially from the value of the explanation.

It is known that unbalanced machinery running at a high speed produces more or less violent oscillations in the supporting framework, which may be, and generally are, extended even to the buildings which contain it; and a little observation will show that these oscillations recur in a species of determinate sequence or rythm bearing a direct relation to the rapidity of revolution of the unbalanced machine. There is, in fact, nothing irregular about them. As the speed of the machine increases, so do they increase in number and intensity, and as their intensity increases in a more rapid ratio than the speed, they quickly become inconvenient, if not dangerous, representing as they do strains which waste power and seriously compromise the stability and permanence of machinery. It will also be understood that they have no connection with the strains properly due to the performance of useful work, and that they have existence in all unbalanced machinery, whether it does or does not run against a load. These oscillations are due, in short, to causes which have nothing whatever to do with the performance of the work which the machine is intended to execute, and there is but one way of removing, or, more properly, of preventing them. Their existence depends on the fact that "the whole centrifugal force of a body of any figure is the same in direction and amount as if the whole mass were concentrated at the center of gravity of the system," and that the centers of gravity and of rotation are not identical.

In order to make the meaning of this proposition perfectly clear, we may suppose the case of a fly-wheel accurately balanced, poised in space, and caused to revolve. The center of gravity of this wheel will be identical with its geometrical center, and it will therefore revolve about this last without displaying any tendency to assume another center of rotation. Let us now further suppose that certain weights are affixed at one side of its rim so that its accurate balance is destroyed, and that things being thus altered it is caused once more to revolve. The center of gravity no longer coincides with the geometrical center of the mass, but the wheel will only revolve about its center of gravity, and therefore that which was before the center of rotation now itself describes a circle whose radius will equal its distance from the new center of gravity. Thus, if the whcel have a diameter of 10 feet, and the weights added on are sufficient to shift the center of gravity 6 inches from the geometrical center, then will the circle described by this last have a diameter of 12 inches, and the wheel will then revolve eccentrically about the new center without developing any vibrating strains whatever. Why this law should have existence no one can pretend to say; we have only to do with the fact that it does exist, and that it is as immutable as the action of gravity itself.

We are now in a position to perceive why want of balance, or, strictly speaking, want of coincidence between the actual center of rotation and the center of gravity of any revolving mass, tends to produce oscillation. We have next to consider the magnitude of the disturbing force, We will suppose a fly-wheel in practice weighing 1,000 lbs., running at any given number of revolutions, and so far out of balance that its true center of gravity is distant 1 foot from its center of rotation. We purposely magnify the error in order to make the matter clear, and instances may be actually met with in which large fly-wheels are nearly a foot out of balance. The shaft being held down in brasses, it follows that the wheel is compelled to revolve about a center other than its center of gravity, and as a result of the tendency which we have seen to exist, the axis of the wheel, in endeavoring itself to describe a circle of 12 inches radius, strains the brasses and framing up and down to the right and to the left. But the framing is weaker in some directions than in others. In these it partially yields to the strains impressed upon it and withdrawn during each revolution, and the result is vibration. Thus, in the case of an unbalanced portable engine, it will be found that the entire structure rocks backward and forward at each stroke, as the shaft is thrust forward and backard in its endeavor to comply with the simple law which we have laid down. We said that the force of disturbance is the same as though the whole weight of the mass were concentrated at the center of gravity; and as in our case the weight is 1,000 lbs., and the radius one foot, the force of perturbation will be precisely the same in amount as if the entire wheel were suppressed and replaced by a single ball weighing 1,000 lbs. and rotating in a circle of 12 inches radius. With this fact before us it is easy to understand how great are the strains thrown on the bearings; and the heating and cutting of the brasses of unbalanced fly-wheels and crank shafts is no longer remarkable in any sense.

According to the theory commonly received by so-called practical men, it is sufficient to balance a crank and connecting rod by a weight or weights disposed within the fly-wheel rim, and this object is carried out with some elegance by forming the rim with recesses or cavities, so that it may be lighter on one side than the other. We shall not go so far as to say that such a practice is wholly erroneous, but we must impress upon our readers the fact that it is very imperfect. A steam engine so counterweighted is not in a strict sense counterweighted at all, and instances have come under our knowledge where recessing the fly-wheel rim has done more harm than good. The expedient would be perfect if the whole rotating mass were concentrated in the same plane, put in practical mechanical engineering this never occurs. Thus, in the case of an ordinary steam engine, we find that the crank and the fly-wheel are in all probability separated by a distance of several feet, and under such circumstances, counterweights applied to the latter cannot possibly compensate for the perturbations due to the gravitation of the former. The axis of the system then tends, at any given period of a revolution, to rotate about a point situated somewhere between the fly-wheel and the crank. Thus to deal once more in suppositions, let a shaft 10 feet long have at each end a fly-wheel similar to that of which we have already spoken, the center of gravity of each wheel being separated from the center of the shaft by a distance of 12 inches. It must further be assumed that the preponderating weights are so arranged as to be equal and opposite. If this shaft were now placed in bearings so that it could revolve freely, it would be found that the wheels would remain at rest in any position in which they might be placed, and from this it might be, and often is, assumed that the system would revolve at any speed without throwing a strain on the brasses. In short, the wheels would be deemed balanced in the full sense of the term. No idea can be more erroneous. If caused to revolve freely in space it would be found that each wheel would act almost independently of the other; the ends of the shaft describing, under the conditions, circles of 12 inches radius, while a point in the center of its length—and this point only—would remain unaffected. Its position may be determined by drawing a line from the center of gravity of one wheel to the center of gravity of the other, the point where this line cuts the axis of the shaft being the point of repose. From this it follows that the only proper method of balancing consists in disposing the counterweights in the same plane as the distributing force. In the strict sense this cannot possibly be accomplished in practice, but we can approximate to such a condition with sufficient accuracy to answer every reasonable purpose. The fly-wheel of an engine can of course be truly balanced with little trouble, but in order to balance the weight of the crank and connecting rod it is advisable to modify the former, converting it into a disk carrying the crank pin near its periphery at one side, while directly opposite a mass of metal must be provided sufficiently heavy to counterweight the proper proportion of the gravity of the connecting rod. Where this system is inapplicable, as in marine engines, the counterweights should be applied directly to the backs of the cranks—an arrangement carried out very perfectly by Messrs. Penn & Son. Each crank should be balanced as though none other existed in the length of the shaft, and the result is then, that, although neither of the weights is in the plane of the rod, yet as one comes on either side, an imaginary plane is constituted, in which the entire mass revolves in perfect balance. In paddle engines precisely the same arrangement should be adopted; a cast-iron paddle constituting a very imperfect substitute, which has sometimes lead to the breakage of a crank shaft, or even of the framing.

The calculation of the exact weight required as a counterbalance in any given case involves some points of considerable nicety; and hitherto the best results have been obtained under the system of trial and error. In point of fact, it is difficult to obtain all the data necessary to render the calculation perfectly complete; and the operation of increasing or reducing the weight of the counterpoises is so simple that no reasonable objection can be urged against a style of practice which is based on direct experiment. It is well, however, to know approximately what are the proper weights for any particular case; and as these are mainly determined by the centrifugal force of the mass to be balanced, the following simple rule for determining this factor will be of service to many

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who do not read formulas with ease:—Multiply the square of the number of revolutions per minute by the diameter of the circle of revolution in feet, and divide the product by the constant 5,870; the quotient is the centrifugal force of the body in parts of its weight, which is supposed to be 1. By this rule the strain on the shaft brasses may be easily determined; and the magnitude of the centrifugal force to be balanced having thus been found, it is a simple matter to determine with approximate accuracy the proportions proper for a counterweight usually revolving in a circle of greater diameter than that described by the crank pin.—*London Engineer.*

Maple Sugar Making.

Mr. A. S. Chapman, of New California, writes as follows to the *Rural New Yorker:*—

I will give you a short article on the making of maple sugar, as practiced in this region by the great makers—men who labor not for fun but for money—whose fathers and grandfathers made sugar here when moccasin tracks and red skins were too abundant for comfort. I will not burden you with a repetition of all the minute details of the business, but will merely give you an outline of their method.

There are some questions not yet settled among our manufacturers. For instance, a part maintain that a tree will last infinitely longer tapped with a gouge or ax than if tapped with a bit or auger, but the great majority use a half or five-eighth inch bit and the common elder spile or conductor. One old gentleman, some 76 years of age, avers that the trees last far longer to bore them.

All agree that well-burned two-gallon crocks are the best to catch the sap, being so easily cleansed—and as they turn them down at the foot of the tree and dispasture the land with sheep, they obviate the necessity of hauling them in and out as they would have to do with wooden or tin buckets.

Immediately after harvest they commence splitting up the old logs, the tops of oak trees and any refuse wood—no matter how rotted, if it will only split and hold together—to pile up or stand on end, and thus they continue to do at leisure times until snow comes, when it is hauled and stood on end at the camp-house.

For storage for sap they use hogsheads, or vats made of two-inch oak plank.

For boiling small kettles are used, holding from 13 to 17 gallons, and at the back of six kettles some place a pan to heat the sap or melt ice (particularly the latter, when they have it.) Sometimes a sudden freeze will come when the crocks are nearly full. If it only freezes over, they take a little forked stick, like an old fashioned pot-hook, break a hole with it through the ice and haul it out with the hook. If it freezes solid, they hit the edge of the crock against a root and out comes the ice in bulk, the saccharine matter preventing its freezing like common water.

One peculiarity of their furnaces is the distance from the bottom of the kettles to the bottom of the furnaces, which is about four feet. Thus it will be seen that while they use very small kettles, they make very great fires under them, and here lies the secret of making good sugar, viz., rapid evaporation in small vessels. The quicker it can be got off the fire without scorching the better. When it "leather aprons," or "makes roads," it is done. Great care is taken to keep the crocks sweet and the kettles clean. When the former get a little slippery or soured they are set out from the tree to catch rain water, and are then scrubbed out and turned down till the next run. When the kettles cannot be washed clean they are filled with hickory bark and burned out, which is far the best way of getting off the burned stuff from the top of them.

When the sirup is done, it is stored away in barrels or casks, until they have leisure and a fair day to sugar it, which is done in the same kettles where it was boiled into sirup. Should the sirup become ropy (sour), saleratus or soda is used to sweeten it.

In sugaring the tops of all the kettles are greased and a small piece of fat pork thrown into each with four or five gallons sirup and boiled with a light brisk fire until it will break in water, when it is dipped into wooden pails and emptied into long stirring-troughs, where it granulates and cools, and when the lumps are worked out it is put away for use or sale.

In conclusion I may say that too much care is not likely to be used to keep the kettles clean, that very rapid evaporation in small quantities (not much together) is necessary to make good sirup, and that insures good sugar.

A. S. Chapman.

New California, Ohio, 1866.

Heating of Air by Compression.

Sir:—I observe that one of your correspondents wishes to know how to calculate the heating effect of compression on air. If the compression is but a small fraction of the original volume, the following rule may be near enough to the truth for most practical purposes:—Find the *absolute temperature* of the air by adding 461 to the temperature in Fah. degrees, or 274 to the temperature in Centigrade degrees; then multiply the absolute temperature by *two-fifths* of the fraction of its original volume, by which the volume of the air is diminished. The product will be the required increase of temperature. The fraction of itself by which the *pressure* is increased during the process is =1·4× the fraction by which the volume is diminished.

Example.—Suppose original temperature to be 39 deg. Fah., then absolute temperature =39 deg.+ 461 deg.=500 deg. Fah. Suppose also the air to be compressed to 99-100ths of its original volume; then fraction expressing the compression=0·01; consequently $0{\cdot}01\times\frac{2}{5}\times500=0{\cdot}004\times500=2$ deg. of Fah. elevation of temperature; also $0{\cdot}01\times1{\cdot}4=0{\cdot}014$, fraction of itself by which the pressure is increased.

When the compression is considerable, the calculation cannot be made with any approach to accuracy without the help of logarithms; and the following is the rule:—Take the logarithm of the ratio which the original volume of the air bears to the compressed volume; multiply that logarithm by 0·408; to the product add the logarithm of the original absolute temperature; the sum will be the logarithm of the new absolute temperature. Also multiply the logarithm of the ratio of the original to the compressed volume by 1·408; the product will be the logarithm of the ratio in which the pressure must be increased.

Example.—Suppose, as in the previous example, that the original absolute temperature is 500 deg. Fah.; suppose the air to be compressed to one-fourth of its original volume; then—

Log 4=.....	0.6020600
Multiply by.....	0·408
Product.....	0·2456405
Add log. 500 (original abs. temp.)....	2·6989700
Log. 880·26 (new abs. temp.).....	2.9446105

880·26 deg.—500 deg.=380·26 Fah., elevation of temperature; and 380·26+39=419·26, new temperature on Fah. ordinary scale. Also 0·60206× 1·408=0·8477005=log. 7·0421, ratio in which the pressure of the air is increased; so that if it is originally at atmospheric pressure, its new pressure is about seven atmospheres.

To find the mechanical work required in order to produce the compression (including that required for expelling the air from the pump) multiply the elevation of temperature, as computed by the preceding rules, by 0·238, and then by 772 if the temperature is expressed in Fah. deg., or by 1,390 if in Centrigrade deg.; the product will be the hight in feet to which the same quantity of work would lift a weight equal to that of the mass of air operated upon. That hight may be stated in other words as $183\frac{1}{2}$ feet per deg. of Fah. or 330 feet per deg. Centrigrade. Thus, in the second example already given, we have 380·26 deg. Fah. for the elevation of temperature, and $380{\cdot}26\times138\frac{1}{2}=69{,}774$ feet, being the hight to which the mechanical work required, would lift a weight equal to the mass of air operated upon.

One lb. avoirdupois of air at the mean atmospheric pressure (14·7 lbs. on the square inch), and at the absolute temperature of melting ice (493 deg. Fah., or 274 deg. cent.), occupies 12·387 cubic feet; and at other pressures and temperatures its volume varies inversely as the pressure and directly as the *absolute* temperature. Divide the original volume of the air operated upon by the volume of 1 lb. at the original pressure and temperature; the quotient will be the weight operated upon in pounds.

It must be borne in mind that in order to realize the elevation of temperature given by the rules, the air must be perfectly dry; if liquid water is present, part of the heat developed takes effect in evaporating the water, and the elevation of temperature is much diminished.

W. J. Macquorn Rankine.

Glasgow University, 3d February, 1866.

[*Mechanics' Magazine.*

Mushroom Ketchup.

The latest public sensation in England in a small way is "Mushroom Ketchup." It seems that no mushrooms are used in the preparation of this delightful compound, but that the base of it is decayed beef liver, called Smithfield mushrooms. The London *Grocer* thus describes the process of manufacture:—

"This is how the crisp mushrooms of Smithfield are prepared for the delicate palates of the discriminating British public, who find poison in and forswear pickles, and lick their lips at the delicious juice of decayed animal matter. Enormous quantities of bullocks' livers—we beg pardon, Smithfield mushrooms—are collected in England, and imported in closed bags from the Continent. These are bought up by ketchup makers—not one or two known roughs, but men who are not generally known as publicans and sinners, and who have the confidence and, we may add, the cash, of the largest distributors of pickles and sauces in the United Kingdom. The mushrooms are salted in tubs, and allowed to remain until the mass becomes thoroughly putrid, and—the details are nasty, but we cannot, in justice to the anti-adulteration league, withhold them—the contents of the tubs are then boiled in iron tanks holding about one hundred and fifty gallons each. Each boiling occupies a whole night. It is never carried on by day, for the simple reason that the stench from the boilers would bring down the indignation of the neighbors, who inconsistently hold out one hand to the poor retailer for cheap luxuries, and with the other destroy the sources of their production. Copper tanks are never used for the boiling operation, for reasons that will be apparent to our readers. All that remains now is to strain off the liquid carefully, and add to its natural fragrance and pungency by mixing with it the spices of 'Araby the blest.' That which remains after the straining operation is immediately covered with a layer of ashes, and sold at convenience to manure dealers."

At a public meeting an attorney for the manufacture defended his client by denying that the livers were from bullocks; they were from hogs.

Have we any mushroom-ketchup makers among us?

American Cotton Stockings.

The Boston *Advertiser* says it has been a subject of frequent remark that improvements in American manufactures went on during the recent war at as rapid a pace as though the country were at peace. In no branch of industry has this advance been more apparent than in the manufacture of cotton hosiery in New England. Many millions of dollars are now invested in this business, and the competition with foreign manufacturers, which has become quite vigorous, is likely to be successful.

Until within eighteen months, the American manufacture has been confined to the common grade of ribbed hose, and no competition with England and Germany, in the manufacture of the finer qualities, has been attempted. Now, however, plain cotton hosiery of the best quality is extensively made by New England workmen, and no one need to seek for imported goods because of a scarcity of fine grades of American manufacture. These remarks will apply as well to the manufacture of cotton shirts, which has reached a great degree of perfection; and American shirts, full fashioned, and without seams, are now made equal to the imported.

The Lawrence Manufacturing Company, at Lowell, have entered largely into this branch of domestic industry, and now manufacture about a thousand dozen of the articles above named per day. A large portion of the labor is done by machinery; but much of it is given out as piece work, to be done outside the manufactory by persons who cannot leave their homes, and thus affords support to many who would otherwise find difficulty in obtaining employment. In this respect the business resembles the shoe manufacture more than any other branch of employment.

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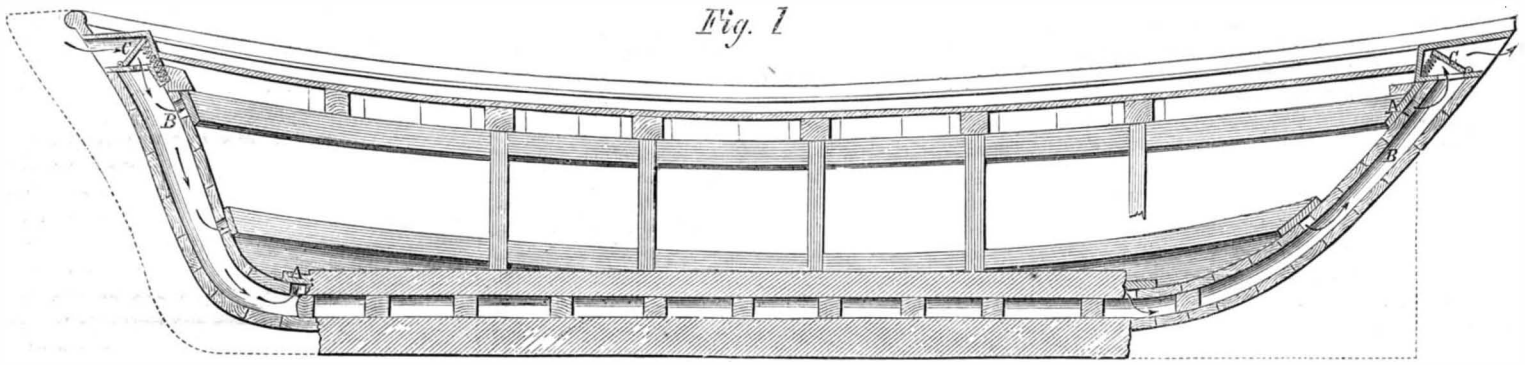
Method of Ventilating Ships.

In these engravings we have illustrated a new plan for effecting perfect ventilation, and for obtaining at the same time a stronger and better vessel than commonly built.

Channels are made at intervals, as at A, by a peculiar arrangement of the timbers and of the planks and ceiling. These communicate with an air passage, B. The latter is open at the bow, and has a valve, C, fitted to it, opening outward. This valve is always open under ordinary circumstances, being kept so by

Fig. 1



WELLS'S METHOD OF VENTILATING SHIPS.

a spiral spring. When a heavy sea strikes it, however, it closes so as to prevent water from getting in.

The air enters this valve, and flowing down the air passage, B, finds its way to the channels cut through the timbers, in the manner shown by the engraving. Even if water should be in the bottom of the ship there are always channels open above to effect ventilation.

The space between the planking and the ceiling is divided by water-tight partitions above and below the decks, as shown in Figs. 2 and 3. These permit the spaces to be filled with brine to preserve the timber, if necessary, and they tend more particularly to prevent the ship from being loaded with water in case the external planking is broken.

It is claimed that vessels so constructed—that is, with an inner and outer skin, ventilated in the manner described, and prevented from being overloaded with water—are safer, more durable, and less expensive in point of repair than ships of the ordinary construction.

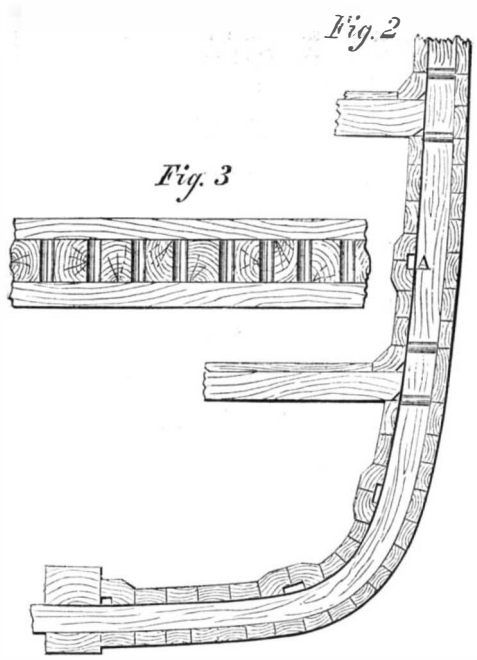
In order to make this plan of constructing a vessel understood, it may be well to say, first, that timber begins to decay at the center of the heart, and the decay goes on more or less rapidly as its situation is more or less exposed, until it reaches the surface. In order to prevent this decay, it must have constant, active ventilation, or else the atmosphere must be entirely expelled from it, as in the case of the keel of a vessel, or timber in other situations—when the absence of air is consequent upon the presence of water, and where the timber under such circumstances is found to be perfect after the lapse of centuries. Either of the above plans can be used separate from the other, or they may be used together, or changed from one to the other without inconvenience, or much expense. Suppose, for example, we commence the construction of a single-deck vessel, 100 feet in length on the keel, 27 feet wide, and 8 feet deep, we side the timber for this frame 10 inches, molding it 10 inches in the throat, and 6 inches at the upper edge of the deck clamp, allowing 20 inches of timber for 24 inches of timber room. This will require 48 square frames, and 4 forward and 3 after canting.

By this arrangement it will be seen that the average space between the two skins or between the out-board planking and the in-board planking, commencing at the upper edge of the deck clamp on one side, round by the bottom of the vessel to the upper edge of the deck clamp on the other side, is 8 inches, and the whole inner surface between the two skins is, if it could be spread out on one flat surface, equal to 100 feet in length by 40 feet in width, and, as before stated, 8 inches in thickness. This space is equal in bulk to 32,000 feet of inch boards, or 67 tuns cubic measure. Into this space the frame proper is to be put, and as we put 20 inches of timber in 24 inches of timber room, we claim five-sixths of this entire space for the frame proper; and five-sixths of 67 tuns is 56 tuns for the frame, leaving 11 tuns, or 440 cubic feet of space not occupied by the frame, to be filled with air or brine, as may best suit the views of the owner. The timber should be first thoroughly soaked or charged with the strong brine, applied before the vessel leaves the stocks, this being much the cheapest and most effective plan of salting the vessel, as by this course every cubic inch of the entire frame and every pore in it, is charged with the strong brine with which this space of 440 cubic feet is filled. The space between the timbers on top is filled in with chocks, so as to make the timber round the entire top solid; each joint being stop-watered so as to give a caulking seam at the upper edge of the deck clamps, and the out-board seam, which is on a line with the -top of the deck clamps. This completes the air-tight arrangement between the two skins.

Next in importance is the plan by which active ventilation is at all times kept up. Supposing that most of the brine, which has previously filled the space between the timbers be pumped off, and the air let in to take its place. Air passages, or avenues, B, run the entire length of the vessel, and are carried out-board at the bow and stern by pipes made of boiler iron. These pipes are attached to each end of each opening, forward and aft. The openings are guarded by light valves C, as represented, which close when struck by a sea, are made on the under side of the thick streaks of ceiling past the frames by taking out of the under edge or corner of the thick streak, a score of 3 inches in depth and 4 inches in

Fig. 2

Fig. 3



width, and when these two thick streaks of ceiling are put together they form an opening of 3 by 8 inches. A half dozen of these openings on a side will at all times give active currents of air passing through the entire frame, the pipes at each end being at all times open, and from which no possible damage can be apprehended, any more than from the cast-iron pipes forward, through which the chains pass. The sides of a ship, with two or more decks, is to be protected in the same way, by being made air-tight between the between-deck water-ways, and the between-deck clamps, in the same way as before described in the single deck vessel.

It is believed that this plan of construction and ventilation would be invaluable to the navy as well as to vessels in the merchant service, and the extra cost over the usual plan of building, in the vessels whose dimensions have been before stated, would not exceed five hundred dollars, and in that proportion for a larger or smaller vessel. And here it may with truth be said, that the extra strength of the vessel would more than twice pay the extra cost, saying nothing about the extra durability and the double safety in having two skins in place of one, so that if a plank should be stripped off the out-board, the in-board planking would protect the lives and property on board. This plan further offers a very cheap and reliable way of testing the perfection and tightness of the work before the vessel leaves the stocks. By inserting a three-quarter inch coupling in the out-board or in-board planking, and attaching a three quarter inch lead pipe to it, and elevating the other end of the pipe say 53 feet, and filling it with water; in this way a pressure of 25 pounds to the square inch is brought to bear on each square inch of the entire inner surface of both skins, or on the vessel whose dimensions have been before stated, where the inner surface of the two skins is 8,000 feet, the entire pressure would be equal to 28,800,000 pounds, or 14,400 tuns. This pressure would rapidly force the brine into every pore of the timber, and the salt required to make the brine to fill the before-mentioned 440 cubic feet not filled by the frame, would not exceed 86 bushels; the brine being as strong as salt would dissolve in water—as one gallon of Turk's Island salt will make 4 gallons of brine of this description. In removing the brine a small portion of it should be left on the dead flat of the floor to operate as a motive power to expel the air first from one side then from the other, as the ship rolls to either side, the air is forced out on that side, while the surrounding atmosphere rushes in to fill the space for the elevated side, and in this way a change of air from the outside is constantly kept up in every part of the ship's frame.

A patent was procured on it Dec. 12, 1865, by Oliver D. Wells, of Westerly, R. I. For further information address Oliver D. Wells as above.

A Collapsed Cylinder Boiler.

Mr. Longridge, engineer to the Manchester Boiler Assurance Company, in his annual report, describes a very unusual accident, which occurred on the 30th October, at a bleachworks in the neighborhood of Bury, and, though not an explosion, it deserves notice. The boiler referred to was 30 feet long by 8 feet 5 inches diameter, made of plates varying from $\frac{5}{16}$ inches to $\frac{3}{8}$ inches in thickness, and had two internal flues 3 feet 2 inches diameter, made of $\frac{3}{8}$ inch plates. The ends were straightened by two longitudinal stays $1\frac{3}{4}$ inches square, secured by straps and cotters, and there was a similar stay above the flues across the boiler near the middle. The boiler was insured to work at a pressure not exceeding 8 lbs. per square inch, and was provided with a safety valve $4\frac{1}{2}$ inches diameter, loaded accordingly. It had also a steam pressure gage and glass tube water gage. About half past ten o'clock in the forenoon of the day mentioned the shell of the boiler collapsed on the right hand side, commencing about 3 feet from the front end, and fracturing through the line of rivets of the fifth circular seam, the collapse extending thence to the back end. The under side of the boiler was also forced upward about 2 inches for a length of 8 feet.

It appears that at the time of the accident there were no fires in the furnaces of this boiler, which was merely used as a steam reservoir, in communication with a range of pipes conveying the exhaust steam from some small high-pressure engines to the drying cylinders and bleaching kiers. There was, however, also a connection with five other boilers, working at

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a pressure of 50 lbs. per square inch, by means of a self-acting equilibrium valve, so arranged as to supply steam at a pressure of 8 lbs. per square inch, in case of need. Shortly before the accident, the attendant observing steam blowing off from the safety valve of the low-pressure boiler (the pressure indicated by the gage being then about 9 lbs.), went to the equilibrium valve and moved the weight on the lever, in order to reduce the supply of steam, and was returning to the fire place when the shell of the boiler collapsed, as already described, accompanied by a noise resembling that of distant thunder.

It appears that the valves communicating with two or three of the bleaching kiers had just been opened, which by causing a rapid condensation of steam, must have produced a partial vacuum in the pipes and low-pressure boiler, and thus caused the collapse, an accident which could not have occurred had there been a vacuum valve upon the boiler. Although this is the first instance of collapse of the shell of a boiler which has come under his notice, Mr. Longridge has no doubt that other boilers of large diameter made of light plates may at times become strained in the seams from the same cause; and as this can be so easily obviated by the attachment of an air valve, it seems advisable to apply one in such cases.—*London Engineer.*

FOREIGN SUMMARY.

It is estimated that 18,000 elephants are yearly killed to supply Sheffield alone with ivory.

Pouillet pointed out in 1822, that when a fluid is absorbed by a porus substance, a rise in temperature takes place.

The attractive force of a magnet being 150 pounds when free from disturbance, fell to one-half by causing an armature to revolve near its poles.

A magnet, the lifting force of which was 220 pounds when the armature was in contact, sustained 90·6 pounds when the armature was $\frac{1}{250}$ inches distant, and 40·5 pounds when $\frac{1}{50}$ inches distance. Thus at 1-50th of an inch distance $\frac{4}{5}$ of the power are lost.

In 1852 the *Wave Queen*, on iron vessel, was launched by Messrs. Robinson, Russel & Co., at Milwall. She was 200 feet long, and only 13 feet wide; engines of 80 horse-power; and she went to Denmark and back more than once. This is possibly the narrowest ship, for the length, ever built.

The cost of wax for sealing patents in 1864 is put down at £157! As the seals weigh upward of two pounds each, could not a saving be effected in this item? There is an officer of state called "Chaff-wax;" has he any connection with the patent department?

The ancient conduits about Jerusalem are of wonderful structure. One, the lower level conduit, formed of stone, follows the contour of the country for twenty-five miles, passing along the bend of a depression in one case of 55 feet depth, and entering the city at an altitude of 2,450 feet. The other, the upper level conduit, is tunneled through a hill at one part, and the blocks are so keyed together as to form a complete siphon.

NEW PUBLICATIONS.

Woodward's Country Homes.—Those who contemplate building country houses and do not wish to consult an architect, can find a great variety of designs to select from in this little volume. Hints on localities and choice of materials, selections of sites, etc., are given so that all tastes are likely to be suited.

The Horticulturist.—No magazine devoted to rural affairs is more welcome to our table than this one. It is not only clear in its descriptions of new plants, fruit, etc., but has an additional value in its illustrations. These are varied in character and relate chiefly to plans for country houses, new fruits, ornamental gardening, insect destructive to vegetation, etc. The several articles are entertaining and without pretension to display.

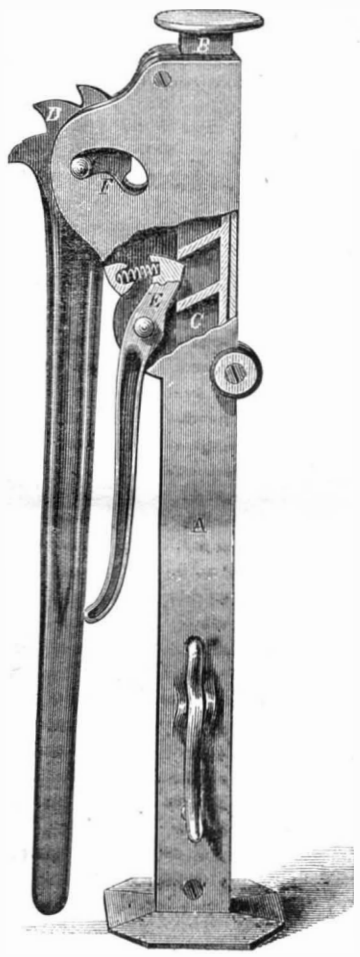
Both published by Geo.E. & F. W. Woodward, No. 37 Park Row, N. Y.

M. Carey Lea, of Philadelphia, one of the most prolific and best writers upon current photographic subjects, has just brought out a very useful edition of Newman's little manual on a harmonious coloring as applied to photographs. The book contains valuable information upon the best modes of lighting and posing the sitter, with a chapter on the production of harmonious negatives. Messrs. Benerman & Wilson, Philadelphia, are the publishers.

WOODWORTH'S CARRIAGE JACK.

A great many people in the world are contented to waste time with "make shifts" to do their work with, when, by a little outlay, they could procure approved tools designed expressly for the purpose, which would effect a great saving. We, and doubtless many of our readers, have seen men washing wagon wheels, greasing axles, and doing other work appertaining to them with the vehicle propped up on saw horses, on rails and similar defective arrangements, being twice as long about it as they would if they had proper appliances; such as a jack, for instance.

The engraving published herewith illustrates a convenient utensil of this class which is extensively used in some parts of the country. It consists, in detail, of a light but strong casting, A, having a bar, B, with ratchet spaces, C, cast in the same, working freely up and down inside of it. Attached to the top is a lever, D, having projections which work in these spaces, and below there is a pawl, E, which abuts against the teeth, and prevents the sliding bar from receding or slipping back. The long lever, D, does not work on a fixed center, but the same slides in a slot, F, so that the lever can be shipped into gear with the ratchet teeth when the axle is to be raised, and then withdrawn again and allowed to hang suspended, so that it is not in the way. The pawl, E, always takes the weight of the wagon so that it cannot fall, and it may be thrown out of connection with the sliding bar, by simply pressing on the end; this permits the wagon to be lowered steadily.



A spiral spring is placed at the bottom of the case for the bar to rest on so that it cannot jam the fingers of the person using it when handling it.

It was patented Dec. 5, 1865, by Albert Woodworth, of North White Creek, N. Y. Address him at that place for further information. State rights for sale.

There are 3,089 miles of railroads in New York State, 962 engines, and capital invested $84,816,200.

The Association for the Prevention of Boiler Explosions.

At the monthly meeting of this Association, held at the office, Coporation street, Manchester, on Jan. 30th, Mr. William Fairbairn, C. E. (President), in the Chair, Mr. L. E. Fletcher, Chief Engineer, in his report said that, during the last month 252 engines have been examined, and 388 boilers, as well as one of the latter tested by hydraulic pressure. Of the boiler examinations, 274 have been external, five internal, and 109 entire. In the boilers examined, 103 defects have been discovered, 8 of those defects being dangerous. Another case of furnace crowns being injured through over heating has been met with, which would have been prevented by the adoption of of e self-acting feed back-pressure valve, and by the feed inlet being fixed above the level of the furnace crowns. Since this subject has been already gone into, we need only to point out that the present is an additional case of injury which would have been prevented by the adoption of the above precautions; and, therefore, affords an additional argument for attention to them. A most important case of external corrosion took place at the bottom of a boiler set on a midfeather, and immediately where in contact with the brickwork. The extent of the injury, as is frequently the case, could not be seen until the brickwork was removed; and, therefore, it is trusted that those members whose boilers are set on midfeather walls will not omit, in preparation for flue examinations, to have the brickwork plowed out where the transverse seams of the boilers rest upon, so that the condition of the plates may be actually seen by our inspectors. Explosions this year are following one another in quick succession, and if they continue at the same rate, the annual list will be a long one. Already, since Jan. 1, six explosions have taken place, one of them of a very disastrous character, eight persons being injured, four of them fatally. The total return for the month up to Jan. 26 is six persons killed and seven others injured. Not one of the boilers in question was under the charge of this association.

An explosion, to which reference may be made, is one of those that will constantly recur so long as steam users continue boilers in work with ill-shaped furnace tubes, and persist in the neglect of the simple precaution of having these tubes strengthened with encircling hoops, flanged seams, or by other suitable means. This explosion took place at a mine. The boiler, which was not under the charge of this association, was of the Cornish class, having a single furnace tube, and being internally fired. Its length was 28 feet, and its diameter in the shell five feet nine inches. The diameter of the furnace tube is not so easily given, since it was of the most irregular shape. At the front end it measured four feet vertically by three feet nine inches horizontally. Midway in its length these proportions were reversed, its height being three feet nine inches, and its width four feet, while at the back end it measured three feet eight inches vertically, and three feet ten inches horizontally. There was not any part of the tube within at least one inch of the true circle, while there were other places more than four inches out of shape. The thickness of the plates was about 3-8ths in. to 7-16ths inch, while the pressure of the steam at the time of the explosion is reported not to have exceeded 20 lbs. per square inch. The furnace tube collapsed from end to end, but it was at the middle of its length, where its width had exceeding its hight by three inches, that the collapse appeared to have commenced, and where the greatest amount of depression took place, the top and bottom of the tube at that part being almost crushed together. It appears that this boiler had nearly collapsed on a previous occasion, when it was repaired, and the furnace tube left in the distorted and thoroughly unsafe state described above. The fact of boiler-makers executing their work in this way, and being entirely ignorant of the danger that must result from it, clearly shows the importance of competent periodical inspection; while this explosion is only another of those, already so numerous, that would have been prevented by the adoption of encircling hoops, flanged seams, water pockets, or water tubes, attention to which although so frequently called in previous reports, it is felt to be a duty again earnestly to urge, even at the risk of tedious repetition.

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Notes and Queries

J. S. L., of N. C.—In our present system—or want of system—of measures, the word gallon has various meanings. The imperial gallon, established by the British Parliament in 1825, holds ten pounds of distilled water, and measures 277·274 cubic inches. The standard gallon of the United States measures 231 cubic inches, and contains 8·3388322 pounds avoirdupois of distilled water at a temperature of 39 83 F.—the temperature of maximum density—the barometer being at 30 inches. The gallon of the State of New York has a capacity of 8 pounds of pure water at its maximum density, or 221·184 cubic inches. If your spring yields 30 New York gallons per minute, the weight will be 240 pounds, and this falling 30 feet will give you 7,200 foot-pounds per minute—a little less than one-fourth of a horse-power; a horse-power is 33,000 pounds falling one foot per minute. In flouring mills from three to five horse-power is required for each run of stones.

C. H., of Conn.—If you raise a weight over a single pulley, of course the size of the pulley will have no effect except on the friction; but if you apply the power to one pulley and the resistance to another, then the force required to raise a given weight, when applied to a pulley of constant size, will be in inverse proportion to the size of the pulley sustaining the resistance. A carriage on large wheels runs more easily than one on small wheels mainly from its greater facility for overcoming obstructions in the road, though the friction of the axles is also less.

C. S. F., of Ohio.—We should suppose that filling your cistern with exhaust steam would injure the cement. If you try it will you please send us the result?

A. A. C., of N. Y.—The power that forces water up the short leg of a syphon is the weight of the air pressing upon the surface of the water; this will never raise water at the surface of the earth more than 34 feet. You may carry steam from your boiler to your engine 1,000 feet, with no perceptible loss of pressure, provided your pipe is of sufficient size, and with little loss from condensation, if your pipe is well buried in wood ashes or other slow conductor of heat.

R. McK., of N. C.—33,000 pounds of water per minute falling one foot produces one horse-power, and a cubic foot of water weighs 62½ pounds.

A Subscriber, of Pa.—If you construct a beehive that will prevent the escape of the queen bee you will stop the propagation of the bees, as cohabitation takes place high in the air, during the hymenial flight of the queen with one of the males or drones.

H. S. B., of Ohio.—As emery is much harder than magnetic oxide of iron, it is universally considered superior as a grinding material. Did you try your experiments fairly?

A. S. C., of N. Y.—We believe that some of the French clock cases you refer to are made of coal.

D. W., of Md.—You had better be careful about scraping the varnish off your black walnut gunstock and applying the dyes published in the SCIENTIFIC AMERICAN. They are well enough on new wood, but where previously saturated with oil and varnish, may not work well. An ounce troy contains 480 grains and 12 ounces make a pound. An ounce avoirdupois contains 437½ grains, and 16 ounces make a pound. A grain is the same in both cases; a pound troy is equal to 5,760 grains, and a pound avoirdupois to 7,000.

E. K. W., of Ill.—Wax for making flowers with is generally made into sheets by rolling it. The clothes wringers ought to answer very well for this purpose if the rolls are not injured.

S. H., of Durham, Eng.—The terms of our paper are $3 per annum, to which must be added the usual international postage. You can subscribe direct, or through our London agents.

C. D. P., of Ind.—You will find a water-proof cement sold in all shoe-finding stores, for fastening leather firmly.

Neptune, of N. Y.—The steamer *Adriatic* was sold to an Irish company, and is now in service in English waters. At the time she was designed and built she was the fastest ship afloat.

W. K. T., of N. Y.—If we should insert nothing in our paper but what is known to a few, we are afraid our readers would consider that we were a little behind the age.

D. C. M., of Pa.—The verdict of the jury on the boiler-explosion case that you were so attentive as to send us, is the stereotyped one in all such disasters. In sea-going steamers surface condensers are generally employed. In these the steam is condensed without coming in contact with the water, and when so condensed is fresh water, and pumped into the boiler again.

H., of N. Y.—The steel you send us is colored by temper, but that is not the way watch hands are tinted.

W. K. T., of Pa.—Oils are extracted from seeds by hydraulic pressure.

W., of N. Y.—Iron, in being heated from 32° to 212°, expands in length one inch in 816 inches. The rate of expansion increases with the temperature.

S. E., of Ill.—Address Henry Carey Baird, of Philadelphia, for works on the mechanic arts.

G. W. M., of Va.—Watt made a series of experiments on the power of horses, and came to the conclusion that the average power of a horse was sufficient to raise about 33,000 pounds one foot high per minute; this has consequently been adopted as the measure of a horse-power. Your heavy oxen would probably have about the same power.

J. B., of Mich.—All works on chemistry describe the composition and properties of the atmosphere; Booth's Encyclopedia of Chemistry has an admirable article on the subject.

C. W. F., of N. Y.—The thinner your steam pipes the more rapidly will you evaporate the liquid in which they are laid.

W. J. V., of N. Y.—The pattern in Brussels carpet is woven in.

Correspondence

Castings from Iron Patterns.

MESSRS. EDITORS:—There are many facts connected with this question, propounded in your issue of the 24th inst.: "Why does cold iron float upon molten iron?" which are worthy of investigation and solution. I have, for nearly thirty years, been connected in one way or another, with the operation of the iron foundery, and have often observed the phenomenon above referred to, and never have I known a piece of cold or even hot, but unmelted, iron to be dropped into molten iron that did not float upon the surface until entirely melted, except in case of its adhesion to the sides or bottom of the ladle—no matter how often it was forced beneath the surface. This fact seems conclusive evidence that the molten has greater specific gravity than cold or unmelted iron. But this fact and conclusion is apparently irreconcilable with the seeming if not real fact that a casting formed in a mold of given dimensions is less, when cold, in its corresponding dimensions than the mold in which it was cast. Now the question arises as to the real or imaginary fact here referred to. Two facts are known to every founderyman: First, that castings are less in at least some of their dimensions than the patterns that they are made from; second, that castings made from iron patterns (we of course mean cast iron), are usually, though not invariably, heavier than the patterns they are made from. These differences are readily accounted for; but the question as to whether castings are naturally less in all their dimensions than the patterns from which they are made is one I am not prepared positively to answer. This is the point that needs demonstration, and if the affirmative be substantiated, then comes the question of reconciling the apparent paradox.

Castings are undoubtedly more or less dense according to the nature of the mold in which they are cast, and I think it likely that if a casting were made in an unyielding mold, and as soon as made was so securely confined as to make any expansion of it during its transition from the fluid to the congealed state impossible, when it becomes cold it will immediately sink if carefully placed upon the surface of molten iron, and will not appear upon the surface again, at least until it has become so nearly melted as to relax what, in common parlance, we call the grain. These remarks, which are mostly suggestive, I hope will induce some person who has solved the problems connected with this subject, or who is in possession of information respecting the results of experiments made, to give us the benefit of the knowledge through the medium of your journal, or, at least, by referring us to the published work, if there be any, containing the desired information upon the points embraced in the discussion of this subject.

H. P.

Philadelphia, Feb. 28, 1866.

[We should like to know how our correspondent satisfied himself that castings made from cast-iron patterns are heavier than the patterns. The statement seems incredible.—EDS.

On Gears.

MESSRS. EDITORS:—I notice in your paper of the 3d instant a communication from "Inquirer," in regard to the pitch of gears. The question he asked may be decided by considering the principles of gear wheels. When gears work into each other points in each describe circles called pitch circles. If now we conceive of two wheels, one of forty and the other of four teeth, to be placed together, there will be a point in them common to both pitch circles, or a point of tangency. Lay off from this a distance equal to the pitch on the larger wheel. Revolve the wheels until this second point becomes the tangent point. All points in the pitch measured on the large pitch circle, and which are approximately on the circle itself, have coincided with the smaller one. Hence it is evident that on the small wheel the distance from the first to the second point must be measured on the pitch circle, and this distance is also the pitch. A good way to do this would be to take, say one-fourth of the pitch, and lay it down four times on the pitch circle, so obtaining the consecutive points for teeth. On large wheels the chord so nearly coincides with the arc that this consideration may be disregarded.

L. S. AUSTIN.

New Haven, Conn., March 3d, 1866.

Light in a Bowl of Water.

MESSRS. EDITORS:—There is one phenomenon of light for which I beg an explanation. I allude to the peculiar illumination which takes place under certain circumstances, at the foot of a column of falling water. For instance: You set a white earthen wash-bowl on the floor or on a stand near a window, at which the sun is shining in. Let a sunbeam pass over the bowl or even strike its edge. Now, from a pitcher held two feet above the bowl, pour a half-inch stream of water into it, and you will observe that the column of falling water, at the point where it strikes the bowl, and for half an inch up its length, is almost as bright as a spot of sunshine itself. You may vary the experiment a thousand ways with results differing only in the intensity of the illumination, and the presence of sunshine is not always necessary. Why this illumination at all?

ARGENT.

Paoli, Ind., Feb. 28, 1866.

[The appearance, doubtless, results from the refraction of light in its passage through the several particles of the broken column of water, and the reflection of light from their surfaces. One of the most brilliant experiments ever exhibited in a lecture room, is the throwing of the electric light upon a column of falling water; the numerous reflections and refractions produce precisely the effect of a cascade of light. This dazzling experiment has been exhibited in England, but not, so far as we are aware, in this country.—EDS.

Relating to Screw Taps.

MESSRS. EDITORS:—There has been quite a dispute in the shop where I work about filing a tap after it is finished, and I should like to have your opinion on the subject. One man says, that after a tap is fluted, in filing it up, that from the top of the thread to the bottom of the flute it should be filed perpendicular; while another one says that it should be filed under, more in the shape of a hook. The most of the hands agree with the last statement.

Another point on which some disagree is in the way the top of the thread is to be left. One says file the top perfectly square, another not at all; and, another, that the cutting side should be left higher than the back side, so that it will not drag. This refers more particularly to the so-called square taps.

I am an apprentice in the shop where this discussion happened and should like to know the correct way to make a tap in the particular parts.

W. W. TARBOX.

Providence, R. I., Feb., 28, 1866.

[A tap is nothing more than a series of screw cutting tools made on a shaft, each tooth of the tap being a tool. It is therefore necessary to file them so that each will cut and none drag. No more should be filed off the back than is necessary to make it clear well, otherwise it will be weakened, and the same applies to the front or cutting edge. If it runs under, the tooth is not only weakened at first but its tendency is to hook or draw in too rank and thus break. It is easy to make any tool cut like a razor for a few times, but what we want are tools that will stand day in and day out. Every one has his own ideas about these things, but we prefer to have taps clear behind and not too much cut under on the working edge—this makes clean sharp threads and safe tools.—EDS.

How to Make Babbitt Metal.

MESSRS. EDITORS:—I never had a chance to get your valuable paper till this year, and I find myself about forty years behind the times. I have been running engines for several years, and find it difficult to get a good article of Babbitt metal; I have no doubt you have told your subscribers how to make it, but it would oblige me very much if you would insert it again.

DAVID STOUT.

Bloomingdale, Ind., Feb. 5th, 1866.

[We do not remember having inserted a recipe for this metal, and therefore give it. It is made in the following proportions:—One pound of copper, one pound of regulus of antimony, and ten pounds of tin.

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Melt the copper first, then the antimony, then the tin, strewing charcoal powder over the crucible to prevent it from burning away. Cast it in bars. It should not be kept hot on the fire any longer than is absolutely essential. Wash the box to be tinned with alcohol, and then sprinkle powdered sal ammoniac on it, hold it over the fire until the same fuses, then plunge it in melted tin. All parts not to be tinned must be washed with clay. Muriate of zinc, that is, zinc cut with muriatic acid, may be employed instead of the ammoniac, where it can be obtained. When the box is tinned it will take the Babbitt, but it must be pretty hot before the Babbitt is poured in.—Eds.

To Color Watch Hands Red.

Messrs. Editors:—I see in your paper a query as to how to make watch hands red. Add to any alcohol varnish scarlet aniline color to suit taste, and apply to the well-polished gold or brass watch hands with a soft camel's hair pencil. W. G. Starke.

Zanesville, Ohio, March 5, 1866.

ANOTHER.

Messrs. Editors:—In reply to a question in your paper, I would say, I have used a solution of dragon's blood in alcohol, for giving the red color to watch hands, and find it gives he desired shade.

C. Leavitt.

Windsorville, Conn., March 1, 1866.

ANOTHER.

Messrs. Editors:—In your last number of the Scientific American, I saw the question, "How is the red color given to the hands of a watch?" I have a method which was given me by a watchmaker, the truth of which I cannot vouch for, as I have not yet had an opportunity to try the experiment; it is as follows:—Mix one ounce of carmine powder and one ounce nitrate of silver with one-half ounce of tinner's japan. Mix them in an earthen vessel over a lamp until a thick paste is formed. Then dip the hands into this paste and lay them on a copper plate which is to be then subjected to the heat of a lamp until the color is produced. Reader.

North Bridgewater, Mass., March 2, 1866.

The Way to Galvanize Cast Iron.

In compliance with the request of a correspondent, we republish the following directions for zincing cast iron:—

Messrs Editors:—For the information of E. D., and others, I place at your disposal some experiments made by myself in galvanizing small cast-iron articles, such as gears and other small parts of machinery. I heated the castings to be galvanized to a red heat, I then plunged them into a bath of clear muriatic acid, to detach the scales and to thoroughly clean them: they are then immersed in a bath of melted zinc. As soon as the iron has attained the melting heat of the zinc they are removed. In this way I have made some beautiful galvanized castings. Great care should be taken, or in plunging the articles into the zinc, while wet, the zinc will be thrown in the face of the operator. The zinc should be covered with sand, and the casting must be immersed very slowly. E. H. Hill.

Worcester, Mass., Oct. 14, 1865.

Items.

Messrs. Editors:—The following items, results of my own experience, may be of interest to some of your readers:—

Solvent for Shellac.—Coal-tar naphtha will dissolve it perfectly. This is not expensive, and can be furnished at about seventy cents per gallon—perhaps cheaper. The odor, however, is offensive. Coal oil or petroleum naphtha will not answer.

Burning Fluid or Camphene.—One part spirits of turpentine, nine parts alcohol. They mix readily. I make my own fluid and have used it for years.

In a late number, you mentioned starch for paste. Add to the starch after it is dissolved and ready for use, a little alcohol; this makes a mechanical mixture, not a chemical one, preserves the starch a long time from fermentation, and does not interfere with the adhesiveness of the paste.

I am glad to see that the United States Revenue Commission advocate a reduction of the tax on raw whisky. The present high price of alcohol is a severe tax upon the chemist, druggist and experimenting technologist. C. C.

Boston, March 6, 1866.

To Tighten a Scroll Chuck.

Messrs. Editors:—I noticed some time ago that you gave an answer to a machinist about a milling tool which, although a little thing, has interested many in this vicinity. Would you give me your opinion on this point?

A great many scroll chucks are in use all over the country, and they are very handy tools. There is one trouble, however, and that is setting them up. Sometimes after you get a piece to run true on the face, if you endeavor to set the jaws tighter it is ten to one but that you screw the wrong way and slack them off, thus losing all the time you spent in straightening the job, besides bruising it and the lathe shears if it falls out, as it is sure to do if heavy. Is there any way to tell which way to turn the disks so as to be sure you are right every time? R. S. C.

Newark, N. J.

[It is easy to tell in a chuck that has been used some time by looking at the edges of the holes. They are burred up on the working side. Every new chuck should be neatly marked with arrows pointing in the direction of the thread, close to the holes.—Eds.

Capsuling Bottles with Gelatin.

At a recent meeting of the Pharmaceutical Society, of London, Mr. Haselden read a paper "On Gelatin as a Material for Capsuling Bottles." He began by reading an extract of considerable length from an article in *Temple Bar*, entitled 'Patents and Patentees," in which the story of the litigation in the matter of Betts' patent metallic capsules is very well told. The article after telling this story, goes on to suggest an efficient substitute for metalic capsules, as follows:—

"We beg leave to suggest to them a most efficient substitute for the patent metallic capsule—namely gelatin applied precisely in the same way as sealing wax or rosin—that is to say, in its melted condition, the top of the bottle being dipped into it. It is obvious that by repeated dippings after cooling any thickness of capsule may be effected. We must observe, however, that gelatin is too brittle when used alone, but fortunately science suggests a ready and effectual 'alloy,' acting precisely like the lead of existing metallic capsules. This alloy is glycerine—that curious substance of which we may say that it is impossible to decide to what purpose it may not be applied. The proportion in which it may be added to the melted gelatin, to give it pliability and toughness, is about one ounce and a-half to the pound of the latter, well stirred in.

"Of course, any colors may be given to these capsules, either for ornament or to distinguish readily the various liquids or other preparations.

"In hot climates there are voracious insects that attack and eat everything—and, of course, they are fond of all animal matter—so that the gelatin capsule will be endangered. But here again we are ready with the remedy. Bitter aloes and other repellants may be added to the melted mass to secure this opportune rival from those tropical plagues.

Mr. Haselden exhibited a variety of bottles capsuled in various styles with gelatin—some with the corks standing up and tied over with gutskin, or leather before dipping in the gelatin; others with the corks cut flush with the mouth and not tied over. All of these had a pleasing and even elegant appearance. The plan the author recommended was to melt the gelatin in as little water as possible, and then to add the glycerine. The color could be given by any convenient material, such as white lead, vermillion, or gamboge. A transparent solution could also be used, and then any trade mark might be fixed on the cork before dipping in the gelatin. Three dippings he had found were sufficient to give a firm protective covering. As regards the cost, he believed it was not equal to that of the metallic capsules.

In answer to a doubt expressed that the gelatin capsules would not resist moisture, Dr. Redwood mentioned that copaiba capsules withstood damp well, and suggested that a dip in a solution of tannic acid might render the capsules more repellant. He stated also that gelatin absorbed three or four times its weight of water, and suggested that the best way of preparing the solution would be to cover the gelatin with water, leave it standing for a night, pour off the water not absorbed in the morning dissolve by heat, and then add the glycerine.

A vote of thanks to Mr. Haselden was passed unanimously.—*Chemical News.*

Hydraulic Lifts for Cupolas.

At the Messrs. Grisseli's works in the Eagle Wharf Road, some very simple hydraulic hoists are in use for raising the materials to the firing stages of the cupolas. They each consist of a small iron table, raised by a ram 6½ inches in diameter, and guided by a frame of angle-irons. The pumps by which the water is supplied to the hydraulic cylinder, are worked by a belt from the shafting of the shops. They are fitted with a cock placed upon their suction pipe, and another cock is placed upon the discharge pipe leading from the hydraulic cylinder to the tank from which the water is drawn. When it is desired to raise the lift, the cock on the discharge pipe is closed, and that on the suction pipe opened by one motion of a lever. On the arrival of the lift at the proper height, a projection on the table strikes a lever, and closes the cock on the suction pipe, and the cock on the discharge pipe still remaining closed, the table is supported in its position. When it is desired to lower the lift, the lever, which we have already mentioned, is merely pushed a little farther over, when the cock on the discharge pipe is opened, and the water being released, the table descends by its own weight. In case of accident to the cook gear, the table is prevented from rising too high by a hole being formed through the lower end of the ram, so that when this rises above the packing of the cylinder it allows the water to escape as rapidly as it is pumped in. The hoists will raise about 2 tuns each, and were designed by Mr. John Ives, the head foreman of the works.

Captain Turner's Trigger-Guard Lock.

We have received an ingenious little contrivance invented by Capt. Henry Turner, of the 3d Manchester Rifles, the object of which is to prevent the possibility of a rifle or gun being used without the owner's permission. It consists of an ordinary lock affixed to one of two cheeks of brass, which, when in use, box in, so to speak, the trigger. The gun may be cocked, and even cleaned, if necessary, but the hammer once raised cannot be let down again, as the trigger is inaccessible while the lock is on. The lock we have before us is intended for the Enfield, but of course a similar lock could be easily made to fit any gun, and, as the inventor points out, its adoption would nearly insure security against the various accidents which arise from leaving loaded guns about a house. Captain Turner believes his invention to be original, but is satisfied with the credit of devising it, and gives it freely to the public.—*Volunteer Service Gazette.*

[Captain Turner has been anticipated in this country by at least *one* person. The American trigger guard consists in a spring so placed and made that no one but those in the secret of it can cock the gun at any time.—Eds.

American Corn at the Great Exhibition.

At the last meeting of the Farmers' Club, Mr. Carpenter announced that he had undertaken to collect and present at the great Paris exhibition specimens of the various kinds of Indian corn raised in the country. If any man has a variety of corn which is peculiar in any respect, he is requested to send a sample to Mr. Carpenter. The sample may be either a couple of ears or two or three kernels, and it should be sent in all cases by mail; the postage on seeds is eight cents per pound. The address is W. S. Carpenter, 156 Reade street, New York.

Mowers, Reapers, Seeders, Cultivators and all Kinds of Machinery.

Since the close of the war many of our old readers and subscribers at the South have made themselves known, and the Scientific American begins to circulate quite extensively in all that region. We have very frequent inquiries from Southern readers for the best Mowers, Reapers, Seeders, etc. We think that the makers of these articles would do well to advertise permanently in the Scientific American.

The Whipple File Company is reported to have failed for $750,000.

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THE PRACTICAL VALUE OF AGRICULTURAL CHEMISTRY.

A great deal of falsehood and nonsense has been published in regard to the chemistry of agriculture, as there has in regard to all other subjects. From the peculiar difficulty of separating truth from falsehood in this department of knowledge, erroneous statements here have been more mischievous than in other departments, and have brought the science into somewhat general contempt. But this contempt is not justified. Agricultural chemistry—when its established conclusions only are accepted—will lead no man into error. Dr. A. Voelcker, the appointed chemist of the Royal Agricultural Society of England, thus states what may be determined by the chemical analysis of soils:—

"In the first place I would remark that the chemical analysis of soils can give very decided answers to the following questions:—

"1. Whether or not barrenness is caused by the presence of an injurious substance, such as sulphate of iron or sulphide of iron?

"2. Whether soils contain common salt, nitrates, or other soluble salts that are useful when highly diluted, but injurious when they occur too abundantly?

"Whether or not barrenness is caused by the preponderance of organic matter, or lime, or sand, or pure clay?

"4. Whether sterility is caused by the absence or deficiency of—

a. Lime.
b. Phosphoric acid.
c. Alkalies, especially potash.
d. Or available mineral (ash-constituents) matters generally.

"Whether clays are fertile or barren?

"6. Whether or not clays are usefully burnt and used in that state as manure?

"7. Whether or not land will be improved by liming?

"8. Whether it is better to apply lime or marl, or clay on a particular soil?

"Whether special manures, such as superphosphate or ammoniacal salts, can be used (of course, discreetly) without permanently injuring the land, or whether the farmer should rather depend upon the liberal application of farm-yard manure that he may restore to the land all the elements of fertility removed in the crops?

"10. What kinds of artificial manures are best suited to soils of various compositions?

"11. Whether deep plowing or steam cultivation is likely to be useful as a means of developing the natural stores of plant-food in the soil?

"12. Whether the food of plants in the soil exists in an available or inert condition?"

Is it not plain that a positive knowledge of these twelve facts would be of considerable value to nearly every farmer? If not in every case, certainly in most cases, they would enable a cultivator to so direct his labor and the application of his manures as to increase the product of his land.

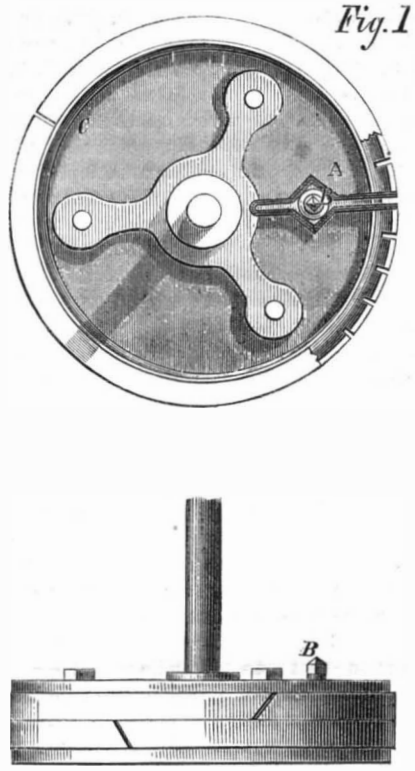
In one respect a knowledge of the chemical composition and growth of plants is of practical value to every agriculturist—that is, in the satisfaction derived from the possession of the knowledge. Why is it advantageous to a man to increase his crops? Because this increase enables him more abundantly to provide food, and clothing, and shelter—to satisfy more completely the needs of his body. But the gratification of animal wants, though the most imperative, is not the sole end of human exertion, "For there is a spirit in man, and the Almighty has given him understanding." The spirit has wants, the gratification of which contributes as positively to the happiness of a man—as practically promotes his well being—as the gratification of his animal desires.

Where is the farmer so stupid that he would not make some exertion for the sake of understanding with clearness and certainty the composition of the plants which he cultivates? Who is not gratified to know the nature of the sixteen elements which enter into their structure—to ascertain which of these are drawn from the solid earth and which from the invisible air? And, finally to learn all that can be known of the decompositions and recombinations which are perpetually going on in the green laboratories that convert his soils and manures into his ripened blades and grains? If there be such, for him agricultural chemistry is of no practical value except to direct his labor more profitably, and thus to fill with larger harvests his cribs and barns.

GOODFELLOW'S PISTON PACKING.

These engravings represent a new method of packing steam pistons so as to render them tight and capable of being subsequently adjusted as they wear without removing the follower or taking the piston apart, as is generally done. Fig. 1 is an elevation and plan view, and Figs. 2 and 3 represent the details. There are three rings as usual, but instead of

Fig. 1



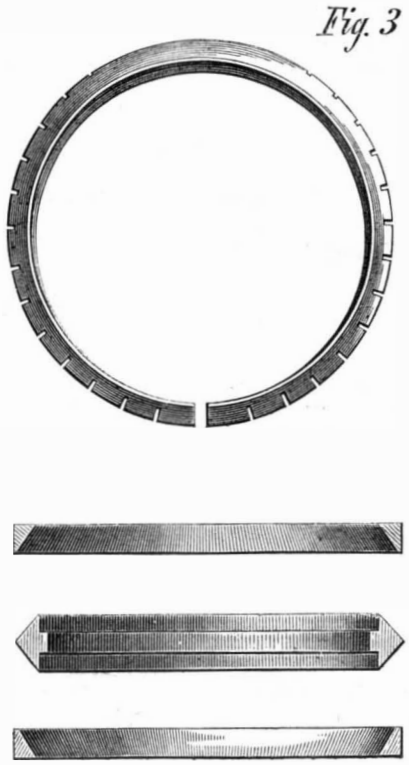
being flat inside they are beveled, as shown in Fig. 2. These rings are also split, and fit one over the other, as in all ordinary pistons. To expand them against the bore of the cylinder the inventor provides a steel spring, A (see Fig. 1), and a coned plug, B. This screws into the bottom plate of the piston, and

Fig. 2

turning it forces the plug against the sides of the spring, and presses it apart, thereby opening the packing in an obvious manner. The inner ring is nicked for a portion of the circumference to render the distension equal at all points.

The inventor claims the following advantages for his arrangement:—A peculiar feature is the shape of the rings and the steel auxiliary spring combined. The rings are made of cast iron, for when composition is used they expand more when hot than the cylinder, and are thereby liable to bind and cut it. Pistons in which the elliptic spring is used are liable to wear uneven and press closer on one side than the other, but as this packing is not so acted upon, it is self-adjusting and therefore wears evenly. Owing to the wedge-like shape of the rings they obviate the corrosion of the edges of the rings and flanges of the piston by keeping the rings not only steam tight against the sides of the cylinder, but also against the flanges of the head and follower.

Fig. 3



One of the best features of this piston is, that while it is perfectly steam tight, it is without excessive friction found in the common packing. This is owing to the peculiarity of the inner ring, it being grooved deeper toward the opening, and also to the eccentric, C, shown inside of the inner ring, which makes it not only very elastic but tends to equalize the pressure of the rings throughout the circumference of the piston. It is not liable to get out of order, neither is there danger of misplacing any of its parts as there is in many other kinds of packing.

Patented Dec. 12, 1865, by S. Goodfellow. For further information concerning this piston, address J. T. Goodfellow, agent, Troy, N. Y.

Costly Axle Grease.

A gentleman who enjoys a country seat in Virginia, received a complaint from his carriage-driver against some patent axle grease he had sent out from the city, and on investigation ascertained that the Fenian had been greasing his wheels with some cans of *pate foie gras* he had provided for lunching.

"*Pate de foie gras*," is a pie of fat geese livers. They are made in Strasbourg, France, and imported to this country at a high price. The only grease about them is a thin coating of leaf lard to preserve them from change. The "Fenian" probably supposed the lard was to apply to the axles.

M. Perrott has communicated to the Academy of Sciences at Paris an account of his apparatus for producing very high temperature by means of coal gas mixed with atmospheric air. He unites a certain number of Bunsen's burners, so that their flames may form a single band of flame without penetrating each other, and thus obtains a column of heated gas, of intense calorific power, in such a position that its energy may be readily controlled. Into this he introduces air in such a manner that as little heat as possible shall be lost. With an apparatus consuming two cubic meters of gas per hour, he states that he has been able to melt 670 grammes of silver, and in 30 minutes to melt and run out into bars a kilogramme of copper.

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REMARKS ON THE COMMISSIONER OF PATENT'S REPORT.

In our last number we published complete the interesting and valuable report of Commissioner Thea ker, in which he presents a tabulated statement of the marvelous progress of invention in our country since 1837, at which time the present system of granting patents was put into practice. The general progress of the country during this period of thirty years has been in exact proportion to the activity of mechanical ingenuity. The two have kept pace with each other, and we may reasonably expect that this parallel will continue so long as our laws are so admirably adapted to foster and protect inventions.

The Commissioner declares that the present patent system has been so uniform for many years that any material alterations would be objectionable. He suggests, however, several minor amendments which are more or less important to the proper transaction of the business of the Office.

We heartily endorse his recommendation that provision be made for the removal of the Agricultural Bureau to some other building.

The business of the Patent Office has increased so rapidly that all the available space in the building must soon be needed for its legitimate business. Congress cannot act too promptly upon this suggestion.

We trust also that the Commissioner's views in regard to the preparation of matter for the annual reports may be adopted. The last report published is that of 1862. These reports lose much of their value and interest from the tardiness in getting them out, and but for the SCIENTIFIC AMERICAN the country would be comparatively ignorant of the progress of invention.

We regret that we cannot endorse the Commissioner's recommendation that an extra fee of ten dollars ought to be paid when an appeal is taken from the primary examiner to the examiners-in-chief. It is possible, and more than probable, that frivolous cases are appealed to the Board of Examiners, but this objection, we think, is not sufficient to warrant the extra tax of ten dollars in all appeal cases. The Board, composed of three persons, at a salary of $3,000 each, was established on purpose to conserve the interests of applicants for patents who might fail to convince the primary examiner of the merits of their claims. There ought certainly to be some tribunal in the Patent Office, where an appeal can be taken in all disputed cases, and that, too, without extra expense to the inventors. During the year 1865 there were filed 10,664 applications for patents, and of this whole number only 465 appeals were taken to the Board—less than one-twentieth of the whole—a proportion by no means extraordinary. This would give 155 cases per annum to each examiner in-chief, and two working days to each case. We would suggest as an amendment, that if the present Appeal Board has more cases than can be properly disposed of, let the force be increased, but do not impose an additional tax upon inventors who now pay enough for their patents. If the patent fund was not sufficient to meet the expenses of the Office the case would appear to us different, but such is not the fact. There are now over $130,000 surplus to the credit of the patent fund. The receipts last year over all expenses were $74,592 50. We can therefore see no good reason why inventors should have their appeal privileges abridged—rather let them be extended.

The Commissioner recommends a change in the law that now works a forfeiture of the applicant's rights, after allowance of the patent and failure to pay the second fee within the limit specified by the law. His proposed amendment enables an inventor, who has been absent on duty in the army and navy, to show the Commissioner that failure to pay was caused by absence on duty in such service. This is a good suggestion, but it does not go quite far enough. The rebellion having ceased, there are a large number of inventors who were residents of States in rebellion, and whose claims lapsed under the limitation of the act of 1861. Some cases of this character of great hardship have recently come to our notice, which ought to be mitigated; therefore we hope the proposed modification will be so drawn as to give the Commissioner discretionary power to grant relief in such cases.

On the whole, the Commissioner's Report is a very excellent and practical document.

FIRE-PROOF WORKSHOPS.

Considering the inflammable nature of factories, and the materials used in them, it is surprising that so few fires occur. When they do, however, the destruction is great and the loss felt far and wide—not alone by insurance companies and the owners, but by those who depend upon them for a living—by the wives and little children of the workmen.

Destructive fires are continually occurring in factories with all the precaution that can be taken. Where the buildings are not fire-proof, a little carelessness or the hand of an incendiary may destroy the labor of years. The burning of Colt's pistol factory is a case in point; a disastrous fire broke out in the Springfield armory, a short time ago, and many other instances might be adduced which would show that accidents of this nature will happen in the best-regulated concerns. The only remedy seems to lie in making the buildings practically incombustible, or, at least, in so arranging them that the damage would be confined to one apartment. There are many ways of effecting partial exemption from fire which might save buildings not fire-proof. One of these we saw recently in an Eastern factory. The structure was of brick, and the floors wood; in all respects save one it was a common factory. This exception was in the floors, which were made double, or water-tight, and at the point of juncture of floor and wall, every crevice was thoroughly sealed. Provision for flooding the apartment was at hand, and when so flooded the water would cover the floor to the depth of an inch or more. It may be urged that if the fire got so far under way as to render the flooding necessary, the walls would be bulged by expansion and render them no longer tight.

The Merrimac Mills, in Lowell, Mass., were fitted with the provision spoken of, but it was found of no utility. The fire started at one end and burnt through the floor, which being saturated with oil consumed in spite of the water rushing over it. One of the mills burnt to the ground.

At West End, New Jersey, a few miles from this city, a large iron building is nearly completed for Messrs. Giles, Wales & Co., who intend manufacturing watches on a large scale. It is one of the finest in the country. It looks like a Crystal Palace from the size and number of the windows; the traveler who passes can see through from one side to the other. The building is 253 feet front, and is three stories high with a basement in addition. There are 606 windows in it, 10 feet high by 5 feet wide; the columns between being only one foot wide.

The Wheeler & Wilson Sewing Machine Company are about to build a fire-proof factory in Bridgeport, Conn., for their business, which will cover two acres of ground. It will be the largest and finest workshop in Connecticut, and be fitted with every preventive against fire. Doubtless other concerns of which we are not informed are being warned in time and are taking similar precaution.

Even though property is insured for every cent of its real value, the loss is not met, for the delay in filling orders, and the consequent diversion of trade into other channels, can hardly be estimated.

The subject of fire-proof workshops is one of so much importance that it commends itself to the attention of all large manufacturing concerns. It would be the work of years to re-build all the machinery now used in the Wheeler & Wilson Sewing Machine Co's factory. The loss of their machinery, though heavily insured, would be a loss of their business; hence this Company now employs several careful men to watch their establishment.

LAUNCH OF WINANS'S FOURTH CIGAR STEAMER.

In our issue of November 6, 1858, we gave an elaborate illustration of Winans's cigar steamer then in process of construction at Baltimore, Md., and in our comments at the time we prophesied the failure of the vessel—a prophecy that was signally fulfilled. The last number of the London *Engineer* has an account of the launching of another vessel on the same plan by Messrs. Winans. She was launched sideways on two cradles, in the same manner as the *Great Eastern*. The *Engineer* says that this is the fourth vessel which has been constructed by Messrs. Winans on this cigar pattern. The places where these were constructed, with their principal dimensions, were as follows:—

1st. In Baltimore—length 635 feet, diameter 16 ft.
2d. In St. Petersburg—length 70 feet, diameter 9 ft.
3d. In Havre—length 72 feet, diameter 9 feet.
4th. In Isle of Dogs—length 256 ft., diameter 16 ft.

The propeller of the first was placed around the middle of the vessel; the second had a propeller beneath her bottom; the third is fitted for trying propellers in various positions; and the fourth has a propeller at each end.

From these numerous experiments with the propelling apparatus, it seems that the projectors are wedded to the belief that the cigar model is a good one, though nearly all ship-builders regard this model as condemned by the most obvious principles of common sense, as well as by the established conclusions of science. If the vessel was to be wholly submerged the form would be excellent; but as she is to float at the surface, the submerged portion only will act upon the water, and it seems to us that the form of that portion is very badly calculated to overcome the resistance of the water.

In the case of a sled, it is well to have the forward end rounded upward in order to compress the snow downward beneath the runner, but water is so little compressible, that the action of a ship upon it in this way is inappreciable—it can be displaced only by being pushed aside; therefore, the vertical wedge is the best form for a ship's bow—and the sharper the wedge the greater may be the velocity of the vessel with any given velocity of displacement of the water. In the spindle ship the vertical axes of the submerged portion of the bow are very blunt in proportion to the relative length and breadth of the vessel, and the sloping from midships upward is of no use.

Again, the resistance of water to lateral displacement increases with the depth from the surface, hence the importance of light draft. The best form of bottom for light draft is one of equal immersion from stem to stern; in the cigar ship the depth of immersion varies throughout the whole length.

Finally, the resistance to high speed is more nearly proportioned to the area of the immersed midship cross section than to any other element; in the cigar ship this area is very much larger in proportion to the tunnage than in vessels of ordinary construction.

The movement of water, however, when it is displaced by vessels in motion, is an exceedingly complicated problem, and we should not have absolute faith in any *a priori* conclusions in relation to it, however reasonable they might appear. It is conceivable that Messrs. Winans may establish the correctness of their opinions by practical demonstrations. At all events, they pay for their costly experiment with their own money, and all must respect the courage, enterprise, and perseverance which they manifest in determining the correctness of their theories.

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ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING MARCH 13, 1866

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

53,094.—Manufacture of Water-proof Paper.—Stephen M. Allen, Woburn, Mass.:

First, I claim a pulp and paper made from vegetable fibrous substances in which the original resinous or albuminous matter is retained with or without the addition of forcing resinous or gelatinous substances, substantially as set forth.

Second, I claim a pulp and paper made from vegetable fiber containing a large proportion of its natural gum, when pulped, in combination with pulped untanned animal fiber; and I claim this whether mixed or not with other foreign resinous or gelatinous substances, as set forth.

Third, I claim the printing, enameling, or glazing or varnishing of a paper prepared in the manner and having the properties herein described.

53,095.—Belting for Machinery.—Stephen M. Allen, Woburn, Mass.:

I claim as a new article of manufacture, belting and banding for driving machinery, prepared and possessing the qualities substantially as herein set forth.

53,096.—Mail Lock.—Theodore Ascherfeld, Elkton, Md. Antedated Feb. 28, 1866:

First, I claim the construction of the lock case, as described, with a bead or projection affording protection to a strip which is wrapped around it, for the purpose described.

Second, I claim the groove around the lock case, in combination with the securing pins or their substantial equivalents, for retaining the strip in position.

Third, I claim the cover, N, in combination with the said lock case, as and for the purpose described.

53,097.—Air Engine.—John B. Atwater, Chicago, Ill.:

First, I claim working engines by the combined action of steam and air, by means substantially as described.

Second, The employment of steam acting directly upon atmospheric air for the purpose of compressing the air into a rarefying chamber, which communicates with the valve chest of an engine, through means substantially as described.

Third, Heating and expanding air and communicating to it certain quantities of moisture by means of steam acting directly upon the air and then further rarefying the air thus heated for the purpose of employing it as a motive agent, through means substantially as herein described.

Fourth The combination of a chambered cylinder, D, with the ported plates, E E' and a steam generator, said cylinder operating substantially as described.

Fifth, The combination of air-supplying chambers, constructed and operating substantially as described, with a rarefying chamber, C, or its equivalent, and a steam generator, substantially as described.

Sixth. Arranging the air rarefying chamber, C, in such relation to the steam generator that the same fire will heat both, substantially as described.

Seventh, The arrangement, substantially as herein described, whereby either rotary or oscillatory motion is communicated to the chambered air supplier, D, from the engine, in such manner that the relative motions of the said supplier, D, and of the engine, will be such that the periods of opening and closing of the valves of the engine will correspond with the opening and closing of the cavities of the air supplier, D, substantially as described.

53,098.—Clothes Wringer.—Selden A. Bailey, Waterford, Mass.:

First, I claim rollers for wringing machines, constructed of alternate layers of india-rubber and perforated cloth, substantially as herein specified.

Second, In combination with a wringing machine, the bench, H, constructed substantially as and for the purposes set forth.

53,099.—Bench for Clothes Wringers.—Selden A. Bailey, Waterford, Mass.:

I claim a bench for wringing machines constructed and operated as herein specified, as a new article of manufacture, consisting of the bench, A, standards, a a, and cross bar, B.

53,100.—Plow.—Wm. J. M. Batchelder, Dayton, Ohio, and Celestin Leiber, Harrisburg, Pa.:

First, We claim the clog piece, a, and slide, d, constructed and operating substantially as described, when connected to a plow beam, for the purpose specified.

Second, The combination of the clog piece, a, slide, d, lever, g, bar, h, and lever, i, constructed and arranged substantially as described and for the purposes set forth.

53,101.—Granaries, Fruit Houses, Etc.—S. R. Beckwith, Cleveland, Ohio:

First, I claim making the room or rooms for preserving grain, fruits, meat, etc., capable of being rendered air tight by means of a water joint, and ventilating said room or rooms by opening said joint, substantially as and for the purposes set forth.

Second, The combination of an ice floor with a gutter or troughs, so as to form an open or tight joint, in the manner and for the purposes substantially as described.

Third, The pipes, C' and D', in combination with the cock, E, gutters, B, and an ice floor, substantially as and for the purposes herein specified.

Fourth, I claim preserving grain, joints, vegetables, etc., in a building whose upper floors are constructed as set forth, for receiving ice, with the room or rooms below said floors capable of being made air tight, and ventilated into and above said floors, in the manner and for the purposes described.

53,102.—Neck Tie.—H. Bendix and J. H. Fleisch, New York City, assignors to H. Bendix:

We claim the combination and arrangement of the hook, a, and elastic band, b, which serves to retain the hook and is attached to the supporting plate by an eyelet, rivet, clasp or other fastening, as and for the purpose described.

53,103.—Kerosene Lamp.—Jacob H. Beidler and A. R. Crihfield, Lincoln, Ill.:

First, I claim in a lamp constructed and operating on the principles above described, making the conducting pipe from the heat generator to the illuminating burner of a non-conducting or slow-conducting material, as described.

Second, The combination of the conducting pipe, B, made of wood or of some other non-conductor or slow conductor of heat, the heat generator, J, the perforated plate, v v, the deflector, F, and the illuminating burner, all constructed, arranged and operating substantially as and for the purpose described.

53,104.—Mode of Raising Heat by the Combustion of Fuel of Various Kinds.—John F. Bennett, Pittsburgh, Pa.:

I claim the mode herein described of producing any required degree of heat for the reducing of metallic oxides, or for other purposes in the arts where high temperatures are required, by introducing two or more blasts of oxygen or atmospheric air, either hot or cold, at such different points in the furnace as that a fresh supply of oxygen shall be introduced at or a little beyond or above the point at which the gaseous deutoxyde (or acid gas) produced by the first supply of oxygen has been reduced to the gaseous protoxide (or oxide gas) by the chemical combination of one atom of the oxygen of the gaseous deutoxide with the element used as fuel, and thus, by a series of successive combustions, continually adding to the heat produced by the first combustion, substantially in the manner and for the purposes hereinbefore described.

53,105.—Machine for Making Plug Tobacco.—John Blackie, New York City:

First, I claim the endless belt trough, E, constructed and operating as and for the purpose as set forth.

Second, In combination with the trough, E, made as described, I claim the roller, D, arranged to operate as set forth.

Third, I claim the scraper, O, arranged to move concentrically with the surface of the roller, D, substantially as shown and described.

Fourth, The combination and arrangement of the adjustable roller, D, the screw, c, and wheels G, with the scraper, o, and trough, E, as and for the purpose herein set forth.

53,106.—Car Brake.—Virgil W. Blanchard, Bridport, Vt.:

First, I claim the employment or use of pivoted shoes, D, connected to rising and falling bars, E, substantially as and for the purpose set forth.

Second, The levers, F M, connected with the shoe bars, E H, for the purpose of transmitting power from the shoes, D, to the shoes, K, substantially as described.

Third, The suspending of the shoe bar, H, from springs attached to the truck frame, substantially as and for the purpose described.

Fourth, The slotted links, N, applied to the levers, M, and pedestals, G, substantially as and for the purpose set forth.

Fifth, The use of the pivoted rubbers, D, bearing against the wheels, B, in combination with the levers, F M, clinks, N, and shoes, K, all being arranged in such a manner that if the wheels revolve in either direction the force or power that results from the contact of the rubber and wheels will be applied to the shoes over the rails, substantially as described.

53,107.—Machine for Making Skewers.—L. W. Boynton, Hartford, Conn.:

I claim the combination of the endless chain feeder with the cutter shaft and its cutters, and the grooved bar or grooved roller, when they are constructed, arranged, and operated substantially as herein described and set forth.

53,108.—Machine for Pointing Skewers.—Leander W. Boynton, Hartford, Conn.:

I claim the cutters, k and k', figs. 3 or 4, in combination with the concave bed piece, D, cap piece, G G, and cylinders, I I, when they are constructed, combined and operated substantially as herein described and set forth.

53,109.—Nozzle for Fire Engines.—Carl Burchardt, New York City:

First, I claim the application of a thin plate, b, to the nozzle of a fire engine, said thin plate being provided with a discharge opening, C, substantially in the manner and for the purpose described.

Second, The chamber, a, between the opening leading from the hose to the nozzle and the discharge opening, C, in the thin plate, b, substantially as and for the purpose set forth.

Third, The vent, d, in combination with the nozzle, N, constructed and operating substantially as and for the purpose specified.

Fourth, The slide, e, or its mechanical equivalent, applied in combination with the discharge opening of the nozzle of a fire engine, substantially as and for the purpose set forth.

53,110.—Reaping and Mowing Machine.—J. M. Canfield, H. E. Coleman, and E. P. Wheeler, Lawrence, Kansas:

First, We claim the combination and arrangement of the lever, F, provided with its movable fulcrum, b, the fingers, G G, the drive wheel, A, with its cams, a, and the pitman rod, N, arranged and operating as and for the purposes specified.

Second, We claim the combination and arrangement of the lever, F, bolt, b, arm, I, rod, J, and lever, K, arranged and operating as and for the purposes herein set forth and shown.

53,111.—Boot-blacking Case.—Edward S. Carter, Keokuk, Iowa:

I claim the combination of the case, A, and the brushes, B B, and brush fastening, E, substantially as described.

53,112.—Washing Machine.—John Catt, Bourbon, Ind.:

I claim the arrangement and combination of the springs, E, eccentric, B, with the friction rollers, C, swinging washer, I, and rod, J, as set forth, for the purpose specified.

53,113.—Machine for Cutting Files.—Aaron Chambers, North Providence, R. I.:

I claim giving to the rocking bed a gradual tipping movement during the operation of cutting the file, substantially in the manner and for the purpose described.

I also claim rolling and controlling the rolling or oscillating movement of the bed by means of a pattern and other suitable appliances, substantially in the manner and for the purpose specified.

53,114.—Letter and Paper File.—W. C. Choate, Washington, D. C.:

I claim an improved file board formed in two parts or sections of a square having hooks or catches, notches or holes, as herein described.

53,115.—Altiscope.—John Clark, Philadelphia, Pa.:

I claim combining with a telescopic column of tubes, an arrangement of mirrors and lenses, such as herein described, with provisions for adjusting these parts to any elevation of the tubes desired, in the manner and for the purpose herein set forth.

53,116.—Extension Holding Strap for Street Railway Cars.—Thomas Coggswell, Boston, Mass.:

I claim, first, In combination with bar, I, or its equivalent, an extension holding strap, substantially as and for the purpose described.

Second, In the construction of such a strap the use of the spiral spring, E, or its equivalent, in combination with the spirally coiled strap, F, both being coiled upon a sleeve, D, or its equivalent, and acting in opposition to each other, the whole being combined with and riding on bar I, either loosely slipping or securely fastened, substantially as described.

53,117.—Pump for Deep Wells.—Robert Cornelius, Philadelphia, Pa.:

I claim the supplemental annular chamber at one or both ends of the stroke, so as to form a circumferential passage for the escape of the gas between the circumference of the pump cylinder and the enlarged chamber, substantially as described.

53,118.—Steam Generator for Heating Purposes.—Isaac E. Craig, Cleveland, Ohio:

First, I claim the flue plates, D, forming a system of supports and flues, f, when arranged between the water chambers, B B', substantially as and for the purpose set forth.

Second, I claim one or more water chambers, B B', when constructed and arranged in relation to each other and flue stay plates, D, as and for the purpose set forth.

Third, I claim the construction of the frame, B'', in combination with the side plates, C, when arranged in the manner and for the purpose set forth.

53,119.—Water Closet.—Hugh H. Cragie, New York City:

I claim a movable pipe for directing a jet or jets of water upward, as arranged in relation to a water closet, substantially as and for the purposes specified.

53,120.—Saw Grinding Machine.—Joseph Croakes, St. Louis, Mo.:

I claim the oscillating bed, B, in combination with the adjustable grindstone, P, arranged and operated by means substantially as and for the purpose herein set forth.

I further claim the crank pulley, E, and friction pulley, H, in connection with the rod, G, and the band, K, passing over the pulleys, J L, on the shafts, I M, all arranged substantially as shown and described, for operating the bed and grindstone from one and the same driving shaft, I.

53,121.—Bed Bottom.—Stephen H. Crossman, Battle Creek, Mich.:

I claim the spring slats as arranged and combined with the end supports and cords, as herein described and for the purposes set forth.

53,122.—Snap Hook.—E. S. Dawson, Syracuse, N. Y.:

I claim the arrangement of the bar, c, recess and groove in the body of the snap with the prongs, d, and spring on the tongue affording the means for the attachment of the tongue to the body and also for guiding and protecting the spring, substantially as described.

53,123.—Churn.—John Davis, 2d, of Lake Village, N. H.:

I claim the open vertical and radical dasher half tubes, g g and h h, arranged and operating substantially as and for the purpose herein specified.

53,124.—Manufacture of Pegs for Shoes.—Geo. W. Day, Charlestown, Mass.:

I claim an artificially rigidified stitch forming material, substantially as described.

53,125.—Stump Extractor.—William Dickerson and H. O. Wilbur, Ridgeberry, Pa.:

First, We claim the combination of the levers, A A and A' A', substantially as described, whereby the operation of pulling the stump is commenced and continued to a certain extent by the one pair, A, and then transferred to and completed by the other pair, A', as and for the purpose explained.

Second, We claim the combination of the two pairs of levers, A A A' A', the prop or support, H H, draft rope, D, links, G G, and the attaching devices, C E F, the whole being constructed and arranged to operate substantially as described.

53,126.—Broom Corn and Sorghum Strippers.—Knowis W. Doudna, Milwood Township, Ohio:

I claim the application to the operation of removing the seeds from broom corn and sorghum cane of the spring or principle of motion produced by dividing a flattened piece of wood so that the dividing lines, starting from opposite ends, shall pass each other for such length and such a distance apart as will secure the approach of the jaws of machine or clamp in a parallel or nearly parallel position when a stalk or stalks of broom corn or sorghum cane is placed between (in a horizontal position) the clamps or jaws of my machine.

53,127.—Combined Spade and Fork.—L. Duvall, Big Spring, Ky.:

I claim the arrangement of the tines permanently attached to a suitable handle and the movable and vibratory tines hinged thereto and operated by the arm, g, and rod, f, or their equivalents, substantially as and for the purpose described.

53,128.—Pump for Deep Wells.—S. H. Burly, Lynchburgh, Va.:

I claim the combination with and arrangement of a pump tube, having the interior tube, G, and the openings, h, in relation to each other and to the valves of the tube, a, and packing D, all substantially as and for the purpose described.

53,129.—Coffee Mill.—Charles R. Edwards, Niagara City, N. Y.:

First, I claim the face piece, k, and regulating bar, t, and hooks, o o, arranged and constructed substantially in the manner and for the purposes set forth.

Second, I claim the guarding of the grinding surfaces from too close contact with each other, substantially as and for the purposes set forth.

Third, I claim so combining the cog wheel, y, and regulating bar, t, with the face piece k, that for the purpose of cleaning the mill, these parts may be removed together and replaced in the mill without becoming separated.

Fourth, I claim the axle, r, cog wheel, p, nut x, and handle, S, in combination, when constructed and arranged specifically as and for the purposes set forth.

53,130.—Weather Strip.—Edmund C. Evans, Cabinet, Pa.:

I claim the movable sill or weather strip, D, provided with the rabbets, a and b, in combination with the strips, C, on the permanent sill, C', or with a permanent sill, having a rebate, d, substantially as specified.

53,131.—Spittoon.—Francis L. Faulkner, Derby, Conn.:

I claim the combination of the grate, C, with the plate, F, when constructed and arranged so that by turning the grate, C, the bowl may be opened, or closed, substantially as and for the purposes specified.

53,132.—Washing and Wringing Machine.—Henry Fisher and Milton Ball, Canton, Ohio:

We claim, first, Connecting the pitman, F, with one of the wringing roller shafts, substantially as and for the purpose herein specified.

Second, Connecting the wringing frame, H, to the tube, ', in an adjustable manner, by means of the shaft, I, annular plate, c, dog, e, and bracket, K, constructed and used as and for the purpose herein specified

Third, Constructing the tub, A, in the manner described, with bottom, B, opening, C, plate, D, and chamber or space, E, when used as and for the purpose herein fully set forth.

53,133.—Sand-paper Holder.—Timothy B. Fitch, Norwalk, Conn.:

I claim a sand-paper holder, constructed and arranged in the manner substantially as herein set forth and described.

53,134.—Wristband.—P. Tenney Gates, Plattsburgh N. Y.:

I claim, first, A reversible wristband unattached to any other garment, constructed substantially as described and for the purpose set forth.

Second, A wristband, pendent from an attachment on the arm, substantially as and for the purposes described.

53,135.—Apparatus for Sprouting Malt.—Joseph Grecmen, Chicago, Ill.:

First, I claim the combination and arrangement of the chamber, A, the perforated vessel, B, and the perforated air chamber, D, substantially as and for the purposes specified.

Second, In combination with the vessel, B, and discharge pipe, C, I claim the employment of a stirrer, E, arranged and operating substantially as and for the purposes set forth.

Third, I claim providing the air chamber, D, when arranged within the vessel, B, with the conical top, E, as and for the purposes described.

Fourth, I claim the employment of a water chamber, A, in combination with the air chamber, D, pipe, I, and receiving vessel, B, arranged as specified and for the purpose set forth.

53,136.—Harvesting Rake.—William F. Goodwin, Washington, D. C.:

First, I claim carrying the rake forth and back over the platform by means of the vibrating arm, B, combined with the arms, C C, and cam wheel, F F, the whole being arranged to operate substantially as described.

Second, I claim the combination with the projection, a', on the rake head of the stud, i, lever, I, roller, J, and wheel, H, whereby the rake is thrown upon its end in an upright position, substantially as and for the purpose set forth.

Third, In combination with a rake operating as described, I claim pins or projections, a2 b1, arranged and operating in the manner and for the purpose explained.

Fourth, I claim the arrangement of the spring, O, and pin, a3, whereby the rake is retained in an upright position during its ineffective stroke, as described.

53,137.—Harvesters.—William K. Goodwin, Washington, D. C.:

I claim the flanged and journaled seats or casings, M, provided with the projections, n n', and screw, m, constituting receptacles for the teeth or cutters, C, and admitting of the independent application and removal of the latter, as described.

53,138.—Grain Binder.—William F. Goodwin, Washington, D. C.:

First, I claim the vibrating fingers, F, fixed upon the shafts, F', of carrier, H, and made to move therewith by means of the springs, I, and bars, F2, substantially as and for the purpose herein specified.

Second, In combination with the above, I claim the series of stationary fingers, G, and shafts or supporting bars, G', said stationary fingers acting in conjunction with the vibrating fingers, F, to form and compress the gavel, substantially as described.

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Third, I claim the arm, H, in combination with the circulating chain or carrier, I, and wheel, J, said devices acting together in the manner described, for the purpose of placing the band around the gavel.

Fourth, I claim the carrier, I, composed of the plates, i, rollers, i', and claws or fingers, i2, as described.

Fifth, I claim the disks or rollers, K, which act on the claws, i2, so as to cause them to open and receive the band when the carrier is in position to take it, substantially as described.

Sixth, I claim constructing the arm, H, with the flanges, h, which afford a bearing for the carrier, I, as it traverses said arm, substantially as set forth.

Seventh, I claim the wheel, J, formed with flanges, j j', and employed to take up, let out and guide the carrier, I, in its movements, substantially as described.

Eighth, I claim the rollers, h8 h8, in the end of the arm, H, which cause the outer claws, i2 i2, to release the end of the band to be grasped by the turning or crossing devices, as described.

Ninth, I claim the two pairs of jaws, m m' m m', adapted to grasp the ends of the band separately and pass one around the other so as to interlock them, substantially as described.

Tenth, I claim the hooked rods, R' R', adapted, after the band has been passed around them, to seize its interlocked ends and draw them beneath the band, substantially as described.

Eleventh, I claim the combination with the hooked rods, R' R', of the sleeves, S S, grooves or slots, s s, and pins, r r, for imparting a rotary movement to the hooks, as and for the purpose specified.

Twelfth, I claim the combination with the clutches, m m', of the plate, L, sleeve, L', rod, M, pivoted arm, n, link, o, and slot, l' all arranged to operate substantially as described.

Thirteenth, I claim the combination with the above of the vibrating lever, N, connecting rod, N', swinging arm, N, and projection, t, through which the requisite vertical movement is transmitted from the main axle, T, to the clutching devices.

Fourteenth, I claim the cradle, E, arranged at one side of the platform to receive the grain from the rake and conduct it to the stationary fingers, G, and permit the fingers, F, to pass under and raise the grain for the purpose of forming the gavel, as described.

Fifteenth, I claim the arrangement of the cam wheel, U, bent arm, a, shaft, b, toothed segment, b', pinion, c, rack, d, and pinion, g, for operating the shafts, F' and J'.

Sixteenth, I claim the reciprocating arm, e3, in combination with the projection, e', protuberance, e7, and spring, e2, for operating the cradle, E.

Seventeenth, I claim the combination of the pinion, O, rack, P, rod, P', oscillating arm, Q, elbow or fork, P2, and roller, L, on the cam wheel, U, said parts operating to give the requisite rotary movement to the devices which clutch and turn the ends of the band.

Eighteenth, In combination with the hooked rods, R' R', I claim the vibrating arm, R2, which is operated by the roller, 4, on the cam wheel, and connected with the rods, R', by the rods, R4 R4 R6 R7, and double-crank shaft, R4.

Nineteenth, I claim the connecting rods, R5, formed with hooked ends, 3 3, to permit them to be readily disengaged, as and for the purpose set forth.

Twentieth, I claim the binder frame, 9 9 10 10, braced by means of the tubular shafts, as herein described.

53,139.—Coffee Pot.—John G. Grove, Cleveland, Ohio:

I claim the arrangement of a coffee pot having a water joint cover, J, an exterior water, C, and tube, D, and the interior coffee chamber, I, and receptable, E, the several parts being constructed and combined substantially as and for the purposes set forth.

53,140.—Roofing Cement.—William Green, Cleveland, Ohio:

I claim a roofing cement composed of the ingredients herein set forth, and prepared and compounded in the manner specified.

53,141.—Churn.—Amos Hamlin, Schoharie, N. Y.:

First, I claim the combination of the handle, E, with a double set of cogs, d d, and the reciprocating shafts, B B, with segment, pinions, C C, all constructed and arranged to operate as and for the purpose specified.

Second, The movable bridge, D, in combination with the shafts, B, dasher, C, handle, E, and tube, A, constructed and operating substantially as and for the purpose described.

53,142.—Mode of Melting and Aggregating Iron Chips, Turnings, Etc.—E. C. Haserick, Lake Village, N. H.:

I claim melting iron chips, shavings or turnings and other fine particles of iron loosely put in a furnace, and preventing them from being burned and blown away, by mixing them with earth or clay and water, substantially as described.

53,143.—Shaft Coupling.—Moses Hawkins, Derby, Conn.:

I claim in the method of coupling shafting the employment in combination of one or more feathers formed on or locked to the shaft, longitudinally, a surrounding collar adapted to embrace the shaft's end, and receive said longitudinal feathers and cross keys, passing through said collar and depression across slots in the shafts, the whole arranged to operate as specified.

53,144.—Burglar Alarm.—M. C. Heptinstall, Enfield, N. C.:

I claim the arrangement and construction of a gun with a mainspring, D, rod, I, movable standard, J, standard, N, and lever, Θ, when arranged, combined, operating and fired from the inside of the box, as herein described and for the purpores set forth.

53,145.—Drilling Machine.—John George Hirzel, Wilmington, Del.:

I claim the combination of the wheels, pinions, slides, ways, plates, springs, screw and couplings, foot piece with slide, and drill bit with heel, as arranged and described, for drilling oval or round holes, constituting a portable metallic self-acting hand drill.

53,146.—Time Piece.—Hoban J. Holden, Genoa, N. Y.:

I claim the tripper, t, the lever, e, the catch, i, and wheel, c, in combination, when used as a differential gear.

53,147.—Cotton Picker.—George A. Howe, Brooklyn, N. Y.:

First, I claim the wheel, C, acting directly upon the endless chain, to rotate it, substantially as described.

Second, Rotating the stripper, D, by means of the endless chain passing around and acting directly upon its axis, substantially as described.

Third, The guards, F F, in combination with the endless toothed chain, constructed, arranged and operating as and for the purpose described.

53,148.—Coffee Roaster.—Fenton Humphrey, Philadelphia, Pa.:

I claim a semi-spherical vessel for roasting coffee and other grains, with the cover, d, having a slot, e, aperture, f, and depending cars, a b, in combination with the agitating device, a b c, substantially as and for the purposes set forth.

53,149.—Fly and Mosquito Bar.—J. Henry Jennings, New Bedford, Mass.:

I claim a portable hinged and fold-up fly and mosquito bar, guard or net, composed of the bows, bars, hinges and fastenings constructed substantially as and for the purpose herein set forth and described.

53,150.—Modes of Securing Tips to Boots and Shoes.—J. Henry Jennings, New Bedford, Mass.:

I claim securing tips to the toes of boots and shoes by a wire or cord laced through its edges, and nails or their equivalents as herein set forth and described for fastening the cord or wire.

53,151.—Fruit Jar.—Josee Johnson, New York City:

First, I claim sinking the confining screw within and below the mouth of a self-sealing can, substantially as and for the purpose herein set forth.

Second, I claim the employment of one or more apertures in the side arranged as represented relatively to the surface on which the cover rests, to allow the loosening of the cover substantially in the manner and for the purpose herein set forth.

Third, I claim the construction and arrangement of the openings, B B, in opposite sides of the neck of the can, and so arranged as to perform the double function of receiving and confining the ends of the cross bar when the cover is held down, and admitting of the action of the same or a different bar to overcome the adhesion of the cover in removing it, substantially in the manner and for the purpose herein set forth.

53,152.—Apparatus for Bleaching Paper Pulp.—Henry L. Jones and Duncan L. Farquharson, Rochester, N. Y.:

First, We claim bleaching the materials to be converted into paper by subjecting the same to the action of bleaching liquor applied under pressure, substantially as described.

Second, We claim the combination with the cylinder, A, of the pump, D, and pipe, B, substantially as and for the purpose set forth.

Third, We claim the combination with the cylinder, A, of the elevated reservoir, E, and pipe, F, substantially as and for the purpose set forth.

Fourth, In combination with the cylinder, A, pump, D, and pipe, P, we claim the valve, O, for relieving the pressure of the liquid, as explained.

53,153.—Fence.—J. E. Kendeigh, Amherst, Ohio:

I claim the grooves, F, and flange, D, in combination with the post and bottom board, arranged as and for the purpose set forth.

Second, I also claim the rib, B, and flanges, D D', in combination with the base, c', and body of the post, as and for the purpose described.

53,154.—Tack and Nail Machine.—Nathaniel Leonard and Nathaniel N. Leonard, North Dighton, Mass.:

We claim the combination of the tack retainer, G, and its operative mechanism with the mechanism for making the tack, that is, for severing it from the strip of metal, and for holding it and heading it, the whole being substantially as described.

We also claim the combination of the bevel, g, and the discharger, I, and its operative mechanism as described, with mechanism for making the tack as explained.

53,155.—Ax.—John L. Lewis, Pittsburgh, Pa.:

I claim forming the blanks for axes of two pieces, by rolling the bars from which said pieces are cut with a groove therein for the handle, and of such a shape that when two of said pieces are put together a cross section thereof will represent an ax without the steel, considered as split longitudinally through the eye.

I also claim rolling said bars with a bevel edge, so that when the blanks are put together they will form a notch for the reception of the steel.

I also claim forming on said bars the projection, T, and corresponding channel, S, for the purpose of holding the blanks in place during the operation of welding.

53,156.—Corn Planter Cultivator.—W. H. Lineback, Greenfield, Ind.:

I claim the spring, K, when arranged and applied to the seed slide, J, and used in connection with the shaft, L, provided with handles, and also connected with the seed slide, J, substantially as described.

53,157.—Saw.—John Lippincott, Pittsburgh, Pa.:

I claim the use in cross-cut saws of a slot or indentation having parallel sides and extending into the blade below the root or termination of the inclined side of the teeth for the purpose of serving as a guide in dressing the saw with a file, so as to preserve the original shape and relative distance apart of the saw teeth, and enable it to be kept in order without gumming.

53,158.—Fan Attachment for Sewing Machines.—Thomas R. Lovett, Mount Airy, Pa.:

I claim operating a fan attachment to a sewing machine by the driving shaft of the machine through the medium of a belt, F, passing over pulleys, c c' c'', and the shaft, c', of the machine, substantially as described.

Second, I claim the guide, f, and wedge slide, g, for throwing the belt, F, into or out of operation, in combination with the standard, D, and shaft, c, substantially as specified.

53,159.—Mode of Preparing Potatoes to Prevent Potato Rot.—Abraham Mallett, Erie, Pa.:

I claim the mode of treating the seed potatoes by extracting the juice by salt and ventilating the hills as set forth.

53,160.—Rotary Steamship.—David F. Masnata, New York City:

I claim an improved recto-rotary or revolving steamship formed by combining an interior stationary cylinder, E, and an exterior surrounding gallery, K, with the shaft, A, and exterior revolving cylinder, B, provided on its exterior surface with alternate paddles and air-tight compartments, the whole being constructed and combined as herein described and for the purposes set forth.

53,161.—Covering for Hose.—Thomas McAuley, San Francisco, and M. L. Cheney, Illinoistown, Cal.:

We claim forming a hose covering by winding rope or cord spirally around a cylinder or former, and having for its support warps or strands of rope or cord passing around each spiral strand by means of a half twist, substantially as and for the purpose herein specified and set forth.

53,162.—Roofing.—John McVay, Columbia, Ohio:

I claim the combination of the V-shaped troughs, E, with grooves, C, and kerfs, D, in the edges of the boards, B, all constructed and arranged in the manner and for the purposes set forth.

53,163.—Instrument for Parting Ladies' Hair.—Joseph L. Meek, New York City:

I claim an instrument to facilitate the parting of ladies' hair, consisting of a yoke, A, and a guide, B B, substantially as herein described.

53,164.—Animal Trap.—Charles Melone, Lawrence, Kansas:

First, I claim the combination and arrangement of the inclined planes, E F, and the movable trap, H, operating as and for the purposes set forth.

Second, I claim the combination of the lever, G, trap, H, weight, I, and spring, J, when arranged with respect to the inclines, E F, substantially as specified and shown.

53,165.—Process for Making Paper Pulp from Wood.—Antonio Mencci, Clifton, N. Y.:

I claim the process of treating vegetable material with dilute nitric and muriatic acids, and then subjecting it to the action of an alkali, substantially as set forth.

53,166.—Pencil Pocket.—Thomas D. Miller, Kankakee, Ill.:

I claim a pocket flaring toward the mouth and having an elastic band applied thereto, substantially as and for the purpose herein shown and described.

53,167.—Distillation of Petroleum.—Adolph Millochan, New York City:

First, I claim the method herein specified of preparing crude oil for distillation by evaporating the benzine and other volatile substances by a coil of pipe containing heated vapors and returning the condensed benzine into the crude oil, as specified.

Second, I claim supplying the crude or partially crude petroleum in a heated state from a vessel, e, containing the same to the outer still, b, and passing the condensed products of the still, b, back into the inner still, c, for the purpose and substantially as specified.

Third, I claim the cock, s, or its equivalent, in combination with the stills, b and c for the purposes set forth.

Fourth, I claim the vessel, e, for containing crude oil, in combination with the stills, b and c, and condensing pipes, d and g, for the purposes and as set forth.

Fifth, I claim the conical bottom to the inner still, applied as and for the purposes set forth.

53,168.—Priming Cartridges.—Arthur Moffatt, Washington, D. C.:

First, I claim a combined rim and center or flange and center-primed cartridge having an anvil to explode the fulminate that is in its center and around its periphery.

Second, I claim a wad or anvil primed with a fulminate, said wad or anvil being consumable when the cartridge is fired, substantially as herein set forth.

Third, An anvil primed with a fulminating material in its center and around its periphery, substantially as and for the purpose set forth.

Fourth, I claim a removable disk or anvil constructed so as to form a bearing for the fulminate around the periphery and in the center of the base of the cartridge case, substantially as herein set forth.

53,169.—Paper-cutting Machine.—Charles Montague, Hartford, Conn.:

First, I claim the arrangement of the reciprocating knife worked by hand, the vertically-moving knife frame, C J, and clamping frame, B I, toothed racks, B C, pinions, L M, and shafts, X X, substantially as herein set forth.

Second, The notched bar, E, pivoted arm, F, reversible pawl, a, and ratchet wheel, H, arranged with reference to each other and with the rack and pinion of the clamping frame, B I, substantially as set forth for the purpose specified.

53,170.—Steam Pump.—John C. Morgan, Alliance, Ohio:

First, I claim the pendulum, P, sleeve, L, and arm, u, in combination with the slide valve, m, gibs, p, and pipes, M N, arranged in the manner and for the purpose substantially as set forth.

Second, The pulley, I, wrists, u', and pendulum, P, in combination with the float, F, and weight, h', arranged in the manner and for the purpose substantially as described.

Third, The float, F, weight, h', and pulley, I, in combination with the pendulum, P, arm, u, and valve, m, arranged in the manner and for the purpose substantially as set forth.

Fourth, The cylinder, A, pipe, C, and valves, F D, in combination with the float, f, and pulley, f, rope or chain, b, and weight, h', when arranged in the manner and for the purpose set forth.

53,171.—Harvester Rake.—John Mumma, Middletown, Ohio:

First, I claim the combination of the crank friction wheel, d, and lever, g, with the fork, f, and its fixed fulcrum block, h, arranged and operating substantially as described for the purpose set forth.

Second, The construction of the lever, g, in the manner described when operated by the pin or friction roll on the rear face of the wheel, d, for elevating the fork during its return motion, substantially as and for the purpose specified.

53,172.—Horse Rake.—S. R. Nye, Barre, Mass.:

First, I claim the dog or clutch, C, in combination with the toothed plate, D, on the hub of the wheel and with the friction roller, c, substantially as shown and described.

Second, The spring pawl, g, arranged and operating substantially as and for the purpose specified.

53,173.—Tin Can Opener.—Eben T. Orne, Chicago, Ill.:

I claim the sharp-edged revolving shear, E, in combination with the stationary cutter, F, when constructed as described and operated for the purpose set forth.

53,174.—Fan Blower.—Frederick Ortlieb, Williamsburgh, N. Y.:

First, I claim arranging a series of spiral or oblique blades on each side, extending equidistant radially with the blades of the fan blower, and rotating therewith, in the manner and for the purposes substantially as herein specified.

Second, The construction of the hub, C, and arrangement of the spiral or oblique blades, E E and E' E', relatively thereto, whereby the center of the casing of the blower is closed to the air, and the air is forced indirectly in range of the fan wings, substantially as herein described.

Third, The casing constructed with its sides open to the full circumference of a circle circumscribing the fan wings, and with yokes, F F, by the removal of one of which the whole rotating portion of the fan is allowed to be drawn out without taking apart the casing, substantially as herein set forth.

Fourth, The combination and arrangement of the open-sided casing, A, the hub, C, closing the center of the said casing, the two series of spiral or oblique blades, E E and E' E', the fan wings B B, and the open yokes, F F, all substantially as herein specified.

53,175.—Nozzle for Fire Engines.—Charles Oyston, Little Falls, N. Y.:

First, I claim giving the spreaders what I term a periodical movement, by means substantially as herein described or any other equivalent means, for the purpose set forth.

Second, The combination of the jacket D, with the spreaders, B, and nozzle, A, substantially as and for the purpose described.

53,176.—Washing and Wringing Machine.—Elias C. Patterson, Chicago, Ill.:

First, I claim the working of the bed, C, over a pivot, D, forming a lever in combination with the roller, substantially as described.

Second, The manner of constructing the wringer in combination with the bed piece, C, and roller, B, substantially as described.

Third, The combination of the apron, B, with the bed, C, substantially as described.

53,177.—Barrel Washing Machine.—Jonathan Peacock, Rockford, Ill.:

First, I claim the arrangement of the revolving frame or frames, provided with head plates, F, and adjusting screws d'' and i, in combination with the clamp screws, f g, as and for the purpose set forth.

Second, I claim the arrangement of the wheel, k, and spring catch, h, in combination with the head plates, F, and revolving frames, as and for the purpose set forth.

Third, I claim the hose lifter, P, in combination with the water trough, as and for the purpose set forth.

Fourth, I claim the slide, H, shifter, T, and spring valve, R, in combination with the trough and index, as and for the purpose specified.

53,178.—Vertical Windlass.—Charles Perley, New York City:

I claim the chain wheel, p', in combination with the capstand, f, and chain wheel, p, substantially as set forth.

53,179.—Feed Cutter.—S. Pettibone, Corunna, Mich:

I claim securing and holding the pivot-arm of a feed-cutter to its mouth-piece by means of wedges or keys, substantially as herein described and for the purpose specified.

And also, in combination with the above, passing the rear portion of the pivot-arm through a mortise or slot of the stationary mouth-piece or any part connected thereto, substantially as herein described.

53,180.—Corn Husker.—Ignatius Philbrook, Shelby, Ill.:

I claim the plate, A, when constructed substantially as described so as to perfectly protect the hand and fingers, and provided with the hook point, C, as and for the purpose specified.

53,181.—Self-Acting Blow Pipe.—Moritz Pinner, New York City:

First, I claim a self-acting or automatic blow pipe, operating substantially as herein set forth.

Second, An automatic blowing-machine that could be used for supplying or exhausting air, or both, alternately.

Third, The combination of an automatic blowing-machine with a gas jet or its equivalent, so as to produce a manageable and easily transferable flame, substantially as described.

Fourth, The combination of the devices herein described, or their equivalent, for heating sad irons, stoves, and other articles, for soldering, glass-blowing, and other industrial and domestic operations for producing a blow-pipe heat, and for the various other objects and purposes hereinbefore set forth and described.

Fifth, The combination of an automatic fan with an air chamber, substantially as described.

53,182.—Sand Box for Locomotive Engines.—Thomas Price and James H. Wilson, Covington, Ky. Antedated March 5, 1866:

We claim the construction of a sand box having an opening connecting with two pipes, e e', said opening having a valve, d, all constructed as above described and for the purpose set for h.

53,183.—Steam Gage.—Emmett Quinn, Washington, D. C.:

I claim a steam gage constructed substantially as described, as an article of manufacture.

53,184.—Mode of Preparing Vessels for Holding Gunpowder.—Albert T. Rand, New York City:

I claim coating a keg, barrel, cask or other package internally with either of the substances before mentioned, or with a mixture of any or all of them, as described and for the purpose set forth.

53,185.—Pumps.—Assaria Rewerick, San Francisco, Cal.:

I claim the cylinders, A and M, and piston, H and N, with their valves, when arranged and operated substantially as described.

53,186.—Axle Box.—O. H. P. Robinson, Bellport, N. Y.:

First, I claim surrounding an axle or shaft having rotary motion with free spherical bodies inclosed within an annular space formed around the axle or shaft so as to form the bearing of such axle or shaft, substantially as described.

Second, I also claim the false axle, H, combined with axle, B, made and applied substantially as above set forth.

53,187.—Breech-loading Fire Arms.—Wm. H. Robertson and George W. Simpson, Hartford, Conn.:

We claim the combination of the segmental breech piece, C, guard lever, H, link, F, shell drawer, L, and toe, g, thereon, all the said parts being constructed and arranged to operate together as herein specified.

53,188.—Sofa Bedstead.—H. S. Rose, Bath, N. Y.:

I claim the sliding supplementary frame, B, having its bottom composed of slats, d, secured at their rearmost ends to the longitudinal bar, n, supported by the tranverse bar, m', the said slats d, working between the slats, b, which form the bottom of the main

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frame or body of the sofa or lounge, all substantially as herein set forth for the purpose specified.

53,189.—Drilling and Driving Machine.—Isreal M. Rose, New York City. Antedated Feb 16, 1866:

I claim, First, The arrangemen of the slide, D, pulley, b, and ropes, a and a', substantially in the manner and for the purpose describe.

Second, The combination of a paying out contrivance and tappet wheel E, with the suspension rope, a, and drill rope, a', substantially as described.

Third, The tappet wheel shaft, B, eccentric, e, pawls, c c, and ratchet wheel, b', with the flanged drum, C, ropes, a and a', all operating substantially as described.

Fourth, The tappet wheel, E, constructed substantially as described, out of two disks, and a transverse pin, d, and fitted to the shaft, B, so as to periodically become loose and fast on said shaft, for the purpose set forth.

Fifth, The reel, G, in combination with the tappet shaft, B, and suspended reciprocating pulley, b, the parts being arranged substantially as described.

Sixth, The application of a crank shaft, N, to the frame, A A', of a machine adapted for pipe driving and drilling, so that said frame may be used for operating a pump, substantially as and for the purpose described.

Seventh, Constructing the jar of a drill with flanged cutters, m m, on it, adapted to serve as reamers, substantially as described.

53,190.—Lubricator.—George Scott, Kensington, Pa.:

I claim First, Supplying lubricating fluid to the bearings of revolving shafting from one or more pumps or pumps, cistern or tanks whence the lubricating fluid is conducted through pipes following the lines of shafting and through branches from the same with or without stop-cocks, on to each separate bearing, such bearings being further provided with receptacles and pipes connecting the same for conducting away the lubricating fluid to a pump or pumps by which it is again raised into the upper pipes for supplying a constant circulation of the lubricating fluid while the shafting is in motion, or in case of hollow shafting being used, passing the lubricating fluid through the center of the shaft and distributing the fluid on to the bearings through small cavities or holes in the bearing.

Second, The construction and employment of apparatus for lubricating the bearings of shafting or axles, in which a revolving wheel, disk, or bent radiating hollow arm, situated in a cistern containing lubricating fluid, is made to convey the lubricating fluid on to the top of the bearing in cavities formed on the circumference of the disk, such cavities having side orifices that are kept closed until the cavities arrive at or near the top of the bearing.

53,191.—Brick Mold.—Samuel Shreffler, Joliet, Ill.:

I claim, First, Constructing a mold for making brick having a frame, A, with partitions, B, and the sloped sliding plate, C, formed and combined substantially as and for the purposes set forth.

Second, In combination with the plate, C, I, claim the hook, F, and catch, D, substantially as and for the purpose set forth.

53,192.—Butter Worker.—Chester F. Smith, Litchfield, Conn.:

First, I claim the form and construction of the shield-shaped tub, as described for the purpose herein specified.

Second, I claim the two stamps, D D', working in the circular grooves in the shields, A A, the same being attached to the hand lever F, operating in the manner described.

Third, I claim the fluted stamp, D, and the concave stamp or beater, D', in combination with the shield-shaped tub for the purposes set forth

53,193.—Facing for Stair Treads.—Oliver Snow, Meriden, Conn.:

I claim the herein described sheet metal facing for stair treads as a new article of manufacture.

53,194.—Amalgamator.—John T. Staats, New York City:

I claim the amalgamation of metallic ores in a closed vessel by the joint action of mercury mercurial fumes, and agitation resulting from the rotation of such vessel, as specified.

53,195.—Lubricator for Steam Engines.—John Storer, New York City:

I claim the cap, D, with projections, C C, the valve or inner lid, E and the screw, F, in combination with each other and with the groove, a, and openings, e e, in the upper part of the cap, substantially as herein specified.

53,196.—Hat Forming Machine.—H. N. Swift, Matteawan, N. Y.:

First, I claim placing the driving wheel, d, of a hat forming machine in a plane parallel with the axis of the pin or stud, a, on which the frame, C, oscillates, instead of at right angles to the same, substantially as and for the purpose described.

Second, The sun and planet gear, h j, or its equivalent, in combination with the driving wheel, d and oscillating frame, C, which carries the rolls, D, substantially as and for the purpose set forth.

Third, The adjustable wrist pin w, in combination with the pinion, h, cog wheel, j, driving wheel, d, and oscillating frame, C, constructed and operating substantially as and for the purpose described.

53,197.—Neck Tie.—George B. Taylor, New York City:

I claim the device, A, for securing a neck tie or ribbon on the neck, including the hooks, C C, at the rear side of the device, and the button or stud, B, substantially as and for the purpose specified.

53,198.—Reaping and Mowing Machine.—D. H. Thayer, Ludlowville, N. Y.:

I claim the head or block G, placed loosely on the axle, A, with the shaft, H, passing through it, and the latter having the crank pulley, M on its front end, in combination with the gearing, I J H, arranged as shown to communicate motion from the axle, A, to shaft, H, and the sleeve or collar, P, to which the finger bar, Q, is attached placed loosely on the shaft H, all arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the securing of the sleeve or collar, P on the shaft, H, by means of the flange b, on the rear end of the sleeve or collar and the lip, c, at the front side of the head or block, G, substantially as described.

53,199.—Device for Feeding Pins.—Cyrus L. Topliff, New York City:

First, I claim a pin-supplying device consisting of the rollers, d and f, when arranged in relation to each other and to the case substantially as described.

Second, The roller, e, in combination with the rollers d f, guide b r, j, and box A, constructed and operating substantially as and for the purpose set forth.

53,200.—Peg Rasper.—Elmer Townsend, Boston, Mass.

I claim the combination of a cutter with the end of a long inclined arm, and arranged to operate for the purpose described.

Also, in combination with a cutter so arranged, of guards, for the purpose specified.

53,201.—Telegraph Insulator.—Wm. W. Waddell, Hillsboro, Ohio:

I claim the telegraphic insulator constructed as herein described, with the shank, A, stem, B, horns, C C', shoulder, D, and coating, E, of vitreous enamel, all constructed and arranged as and for the purposes specified.

53,202.—Device for Changing Speed.—John H. Wait, Portsmouth, Ohio:

I claim the series of conical gear wheels, b b', in combination with the movable frame, d, and two conical gear wheels, e e', arranged as above described and for the purpose set forth.

53,203.—Apparatus for Cleaning Boiler Tubes.—Henry Waterman, Brooklyn, N. Y.:

I claim a series of spring scrapers arranged around a central stock, in combination with a clearing out piston or disk, substantially as set forth.

I also claim the spring scrapers constructed of different lengths, whereby the series can be more conveniently inserted within the tube as set forth.

53,204.—Machine for Cutting Files.—Alfred Weed, Boston, Mass.:

I claim the combined arrangement of parts operating together substantially as described, for varying relatively to each other, at the same time and from the same indicator, the force of the cutting blow and the extent of the feed movement.

I also claim the employment of the friction pawl, h', acting upon the surface of the feed wheel, h, substantially as set forth.

I also claim in combination with the feed wheel, h, the brake wheel, b', operating as a retaining pawl, substantially as set forth,

53,205.—Cultivator.—W. S. Weir, Jr., Monmouth, Ill.:

I claim the combination with the plate, F, ears, g g, and journal, e, of the grooved bearing plates, C C, cylindrical projections, c c, plates, B B, and screw bolt, f all constructed and arranged to operate in the manner and for the purpose specified.

53,206.—Lining for Artificial Limbs.—James W. Weston, New York City. Antedated March 6, 1866:

I claim a lining for artificial limbs, at the parts where the stump is received, formed of thin sheet cork, substantially as and for the purposes specified

53,207.—Device for Watering Cattle.—Oscar Whedon, Medina, N. Y.:

I claim the combination and arrangement of the several parts consisting of the cistern, A conductor pipe, B trough, C, connecting pipe D, and bent pipe, E, all as shown and for the purposes specified

23,208.—Method of Burning Waste Coal.—J. D. Whelpley and Jacob J. Storer, Boston, Mass.:

We claim the use of finely comminuted fuel, or dust of fuel, mingled with the air used in supporting the combustion of the gases of furnaces and fire boxes.

53,209.—Propelling Wheeled Vehicles.—John G. Wilkison, Quincy, Ohio:

I claim the shaft, E, provided with the pulleys F F, and the wheels, k k bands, G H, pulleys, C, for propelling the vehicle, in the manner and for the purpose herein specified.

53,210.—Wagon Brake.—J. H. Wilkinson, Kickapoo, Ill.:

First, The rods, e e and f f, in combination with the clip, D, and brakes E E, substantially as shown and described.

Second, the clip, D, in combinarion with the sliding reach, B, and stationary reach, C, and brakes, E E, substantially as and for the purpose specified.

Third, The combination of the sliding reach, B, stationary reach, C, clip, D, brakes E E, rods, e e and f f, and hind and forward axles of a vehicle, all operating together substantially as and for the purpose specified.

53,211.—Stave Machine.—John R. Winfield and Wm. S. Colwell, Pittsburgh, Pa.:

We claim constructing the forcing bar, D, with a revolving head, N, for taking the friction off the end of the bolt during the operation of forcing it through the space between the knives, as herein set forth.

Also in making the guide box, A, that supports and carries the forcing bar, D, adjustable so as to give direction to the bolt, and cause it to press or bear harder against either knife, as the nature and size of the wood may require.

53,212.—Cultivator.—George W. Zeigler, Tiffin, Ohio:

First, I claim constructing the shovel plow with a movable cross arm or plate, C, and so arranging the same that the shovels can all be moved either to the right or left of the beam in oblique directions to the line of draft, substantially as specified.

Second, The application of spring braces, k, to the pivoted shovels and their standards, substantially as described.

Third, The construction of the shovel-holding plate, C, with lugs, c c, to receive the outside shovel standards, and also with a flat upper surface having notches in it to receive spurs which project from the bottom surface of the flanged casting, B, substantially as described.

Fourth, The construction of the central standard, g', with a pin, e, so that the plates C B can be secured to the beam, A, in the act of securing the central shovel to the plow, substantially as described.

Fifth, The combination of the flanged casting, B, with the shovel holder, C, these two parts being constructed substantially as described.

Sixth, The construction of the shovels with detachable points, p, substantially as described.

Seventh, Providing for adjusting all the shovels about a central axis simultaneously when these shovels are attached to standards that can be adjusted and secured in position independently of each other, substantially as described.

58,213.—Railroad Switch.—John W. Zinn, Caldwell, N. J.:

I claim the combination of the lever, H, locking bar, F, spring, K, switch rail s, C C, projection, P, and spring latch, N, constructed and operating substantially as described and represented.

53,214.—Propelling Carriages.—Charles K. Bradford (assignor to himself, C. B. Sanderson, and Minot Terrill, Jr.), Lynn, Mass.:

First, I claim the combination of the connecting rods, B, with the friction band, K, and the clutch, C, transmitting motion to the wheel, G, as described, in one direction only, substantially as and for the purpose described.

Second, the combination of the pivot pin, L, with the lever, A, having notches, E E, so that the leverage may be increased or diminished at will for the purpose described.

Third, The combination of the notched levers, A, with the combination set forth in the first claim, so as to allow greater power to be exerted without increasing the length of the stroke.

53,215.—Car Coupling.—Ebenezer Cary (assignor to himself, Horace H. Hawley, and John Sully), Burlington, Iowa:

In combination with the coupling pin, D, constructed as described, I claim the peculiar shaped opening, c, in the draw head, A, whereby the pin, being raised and turned, may be supported independently of the hook in the draw head, in the manner as herein described.

53,216.—Machine for Boring Hubs.—L. A. Dole (assignor to himself and A. R. Silver), Salem, Ohio:

First, I claim the combination of the fixed chuck plate, D, adjusting plate, C, hollow supporting frame, A, and the turning cape, c, with the adjusting bearing plate, c2, substantially as described.

Second, The combination of the scroll-adjusting plate, C, chuck plate, D, oscillating nut, a, auger shaft, B, and adjustable bearing, c2, substantially as described.

Third, The radial arms, E, provided with adjustable sliding blocks, j j, in combination with a centering chuck and auger shaft, substantially as described.

Fourth, The stepped blocks, j, when applied to radial arms, E, and used substantially as described.

53,217.—Method of Preserving Wood.—H. L. Eddy, Geneva, N. Y, assignor to himself and A. Dunlap, Ovid, N. Y.:

I claim the application of petroleum or its liquid products to wood or other fibrous substances, as an antiseptic or preservative agent.

53,218—Mode of Grinding the Mouth Edges of Glass Jars.—Oliver O. G. Elliott (assignor to himself and A. R. Samuel), Philadelphia, Pa.:

I claim grinding the mouth edges of glass jars by simultaneously revolving a series of them against a grinding disk in motion, substantially as and for the purposes described.

53,219.—Coupling Shafts of Boring Tools.—Samuel Fawcett (assignor to himself and Alanson Brown), Rochester, N. Y. Antedated March 2, 1866:

I claim the manner of coupling or joining two pieces together by means of a corrugated or irregular joint, a taper sleeve or band fitting over the same, in combination with joint nuts to hold it firm, substantially in the manner and for the purpose described

53,220.—Linchpin.—Louis B. Gusman (assignor to himself and and Edwin Steer), Philadelphia, Pa.:

I claim the linchpin, C, with its slot, x, in combination with the spring D, the latter being constructed and attached to the linchpin substantially as and for the purpose described.

53,221.—Ore Washer.—George B. Hamilton (assignor to himself and Andrew Noerr), Washington, D. C.:

First, The construction and use of the oblique agitator or hollow cylinder, so arranged and operated that the water flows from the lower to the upper end of the cylinder, substantially as described.

Second, I claim discharging the washed ore through the shaft of the cylinder, substantially as set forth.

Third, I claim the use of the trunks, G, for dipping the water into the cylinder, C, substantially as specified.

Fourth, I claim the combination of the cylinder, C, with the trips, L, lever, M, and screw, K, substantially as described.

53,222.—Car Spring.—Albert Hebbard (assignor to himself and John P. Onderdonk), Buffalo, N. Y.:

I claim a metallic nest spring, the several separate springs thereof being coiled, the first right and the second left, and so on alternately, and placed in nest, for the purposes and substantially as described.

53,223.—Brick Machine.—James Hotchkiss (assignor to himself and Ezra Buss), Springfield, Ohio:

First I claim the combination of the continuously-revolving inclined arms, a a, in the pug mill, with the intermittently-moving mold wheel, G, substantially as herein specified.

Second, I also claim the side chamber, c, extending from the pug mill over the exit path of the mold wheel, for the purpose set forth.

Third, I also claim the removable block, K, closing the outer end of the chamber, c and held therein by the wooden or frangible pin, k, for the purpose specified.

Fourth, I also claim the arrangement of the scraper, L, with its lever, O and adjustable weight d, substantially as set forth.

Fifth, I also claim the combination of the two toggle joints or sets of toggles, M M and N N, actuated substantially as described, in combination with the intermittently-moving mold wheel, G, for pressing the bricks, while yet in the forming molds, substantially as herein specified.

Sixth, I also claim the combined arrangement of the adjustable toggle-moving eccentrics, Q Q, and the crank, T, and pawl, R, for giving an intermittent motion to the mold wheel, substantially as herein described.

Seventh, I also claim the combination of the crank wrist, U, pawl, R, sliding thereon, and the frangible pin, t, for the purpose set forth.

Eighth, I also claim the combined arrangement of the projections, g g, on the periphery of the mold wheel, the pawl, R, and spring pressure roller, h, for the purpose specified

Ninth, I also claim the hinged or movable track, S, under the mold wheel, in combination with the adjustable toggles, N N, beneath it, as herein specified.

Tenth, I also claim the device for tilting the bricks edgewise from the followers upon the mold wheel, arranged and operating substantially as herein set forth.

Eleventh, I also claim the arrangement of the spring roller, W, in combination with the mold followers, J J, for the purpose specified.

Twelfth, I also claim the suspension of the followers, J J, in their molds, by means of the notch or slot, e, in each, and the pins, F F, or the equivalent thereof, substantially as herein set forth.

53,224.—Knitting Machine.—James A. and Henry A. House (assignors to Bridgeport Knitting Company), Bridgeport, Conn.:

First, We claim a chain of needles in a knitting machine, when the same are constructed so as to be hooked together substantially in the manner and for the purpose specified.

Second, Constructing the needles with their hooked ends upon one side of their center, substantially as and for the purpose set forth.

Third, One or more hooks, e, in combination with the chain of needles, when the chain of needles is constructed and arranged to operate substantially in the manner and for the purpose herein set forth.

Fourth, The combination of one or more hooks, e, with a vibrating sinker, a', constructed and arranged to operate together substantially in the manner and for the purpose specified.

Fifth, The adjustable stand, N', arranged in combination with and constructed so as to adjust the movement of the cam, a2.

Sixth, The working bar, A', constructed and arranged so as to operate the hook, e, the thread guide, D', and sinker, a, substantially in the manner and for the purpose described.

Seventh One or more yarn guides, D', in combination with one or more hooks, e, and a chain of needles, when the said chain of needles is constructed in the manner described.

Eighth, The combination of levers, A2 and L', with the switching lever, P, substantially in the manner and for the purpose described.

Ninth, The combination of the latch, s, and the switching lever, P, substantially as and for the purpose specified.

Tenth, The combination of one or more tops, T, with the chain and needles, when arranged to operate the switching lever, P, substantially as and for the purpose set forth.

Eleventh, The pressure spring, S2, in combination with a chain of needles, when the chain of needles is constructed and arranged to operate substantially as and for the purpose set forth.

Twelfth, The projecting plates r2 and r2, covering the wheels, E and E, in the manner and for the purpose described.

53,225.—Composition for Making Anatomical Casts.—Joseph Hurford, Salem, Ohio, assignor to Joseph P. Gill, Franklin, Ind.:

I claim a composition for making casts, compounded and prepared substantially as set forth.

53,226.—Evaporator and Cooler.—Henry Kohly, Jr. (assignor to himself and J. Curtis), Potosi, Mo.:

First, I claim the air space, I formed between the jacket, F, and boiler, C, in combination with the boiler, D, volute channel, A, and flues, H J, constructed and operating substantially as and for the purpose described

Second, Making the boiler, B, partially or wholly self-supporting, by carrying into it the condensed water resulting from the steam over the volute channel, substantially as and for the purpose set forth.

53,227.—Pie or Plate Tongs.—Alvin Lawrence (assignor to himself, Ambrose Lawrence, and John E. Crane), Lowell, Mass.:

First, I claim the combination of the legs, A and B, the same having drops, g and b, and toes, c and h, the coil or hinge, k, handles, d and l, spring, m, drop, e, and toe, f, the whole arranged substantially as and for the purpose specified

Second, And in combination with the leg, A and B and the coil k, the drops, g b and e, or their equivalent, substantially as and for the purpose specified.

Third. And in combination with the legs, A and B, and coil, k, and in connection with the drops, g b and e, the toes, c h and f, substantially as and for the purpose explained.

Fourth, And in combination with the handle, d and l, the legs, A and B, and coil, k, the spring, m, when the said spring forms a part of one handle, and sets against the other, substantially in the manner and for the purpose set forth.

Fifth, The coil, k, in combination with the legs, A and B, and handles, d, and l, when the said coil is made to serve as a hinge and stop, substantially as and for the purpose set forth.

53,228.—Machine for Perforating Metal Brand.—Amos Leland (assignor to himself and Alexander P. Colesberry), Philadelphia, Pa.:

First, I claim the cylinder, H, with its pins, a, and rif, e, and the cylinder, I, with its flanges, b, openings, i, and rif, e, constructed and operating in each other, a and for the purpose specified.

Second, The combination with the cylinder, H, of the spring d, for retaining the ends of the bands substantially as described.

52,229.—Evaporator.—Charles and David Mercer, Strickerville, Pa., assignor to Blymyer, Bates and Day:

First, We claim applying the steam beneath the bottom of the pan, in such a manner as to heat the center and leave cooling sides for a deposit or rest of the scum.

Second, Applying steam beneath an open pan so that the interior thereof shall be unobstructed for the work of the operator.

Third, The combination with evaporating pans of a steam chamber, constructed as described.

53,230.—Fastening for Bail Hoops.—John F. Milligan (assignor to himself and Richard Branch), St. Louis, Mo.:

I claim the button, a, with its head set obliquely to the plane of the hoop and with an oblique flange, d, operating in the manner and for the purpose herein described.

53,231.—Leggins.—Albert L. Munson, New Haven, Conn., assignor to himself and Samuel T. Williams, Washington, D. C.:

First, I claim a legging made wholly or partially of paper, whether united to the boot foot as a boot leg or separate therefrom as a gaiter or anklet, or imitation of stocking leg or drawers, all substantially as described, and whether embossed, or printed, or painted, or stained, or enameled, or perforated or otherwise ornamented or not.

Second, Making such article to open in the direction of its length.

Third, Connecting the sections of said opened legging, by means of elastic attachment, whether of cloth or cord.

53,232.—Well Boring Apparatus.—Thomas J. Parke (assignor to himself Jossiah Byran, Israel Gillespie and E. A. Huntsicker), Philadelphia, Pa. Antedated Nov. 8, 1865:

First, I claim the cam wheel, H, plate, J, with its pin, d, and

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the arm, 4, constructed and operating in combination with each other and the ropes to which a rock drill is attached, substantially as described.

Second. The screw rod, N, secured to a vibrating lever in combination with the adjustable box, O, yoke, P, and clamp plates, n n', or their equivalents, substantially as and for the purpose specified.

Third. The box, O, with its spring, K, combined with the rod, N, its nut, and the rope, X, substantially as and for the purpose described.

53,233.—Direction Label.—Milo J. Proctor (assignor to himself and Wheelock Tilton), Lowell, Mass.:

I claim, First, The wire, a, which gives strength and firmness to the label.

Second. I claim the loop, b, which gives convenience in attaching the label to articles for the purposes described and manner set forth.

53,234.—Eyelet.—Jesse F. Richards, Attleborough, Mass., assignor to the American Eyelet Company, Providence, R. I.:

I claim the improved eyelet possessing the characteristics substantially as herein described.

53,235.—Car Brake.—Jesse B. Rumsey, Tiffin, Ohio: assignor to James G. Rumsey, Washington, D. C.,

I claim the combination of the lever, D, with the chains, E, brake shaft, F, and brake, C, when used in the manner and for the purpose herein set forth

53,236.—Gearing for Grinding and other Rollers.—Willard E. Sibley, Weston, Mass., assignor to Nathan L. Sibley:

First. I claim connecting the shaft of the rollers, B and B' by the pinions, C and I, and the external gear, D, and internal gear, H, substantially as described

Second. I also claim linking the shafts of the rollers or pinions and the pivot of the external and internal gears together, substantially as described, so that the pinions and gear will always mesh properly, whether the rollers are worked near together or far apart.

Third, I also claim the plate, J, in combination with the pinion and gear, substantially as described, for the purpose set forth.

53,237.—Quartz Mill.—F. Sundell (assignor to himself and Anthony Chabot), New York City:

First, I claim the rotating cylinder consisting of the heads, C C', and slats, D, and provided with the strips of plates, d d, plate, F, feed opening, a, springs, e, and strips, f, all arranged to operate in the manner and for the purpose herein specified.

Second One or more screens, E, applied to the cylinder to operate in connection therewith, substantially as and for the purpose set forth.

53,238.—Automatic Boiler Feeder.—J. R. Widgeon (assignor to himself and Fred. E. Frey), Bucyrus, Ohio:

I claim the segmental cog wheel, n, in combination with the chamber, A, having ports, l m, and with the seat, B, provided with holes, d e f g, substantially as and for the purpose described.

53,239.—Burglar Alarm for Windows.—W. H. Winans (assignor to himself and W. R. Finch), Coxsackie, N. Y.:

First, I claim the stationary plate, K, in combination with the sliding plate, L, provided respectively with slots, a b and a ranged with the clapper rod, G, of an alarm, to operate, when applied to a window, substantially in the manner as and for the purpose herein set forth.

Second, I further claim the latch or fastening, g, on the top of the alarm case, A, in combination with the clapper rod, G, to operate as and for the purpose specified.

53,240.—Railroad Track.—Hugh Baines, Manchester, Eng.:

I claim the combination of ties, longitudinals, diagonals, rails, fish plates, lock latches, expansion and contraction miters resting on chairs of the diagonals, at every quarter of a mile, more or less, of the railroad allowing no expansion or contraction at each rail length, but making one continuous rail for a quarter of a mile, more or less, to expand in and contract out of miters, E and G, substantially as described.

52,341.—Manufacture of Coloring Matter from Aniline.—Philibert Chevalier, Lyons, France:

First, I claim as new products the coloring matter herein described, derived from aniline and its homologues.

Second, The process of producing the said coloring matters, substantially as herein described and set forth.

53,242.—Machine for Bending Cranks on Rods.—Edward Lord, Todmorden, England:

I claim the combination and arrangement of machinery described and shown in sheet, 1, or any equivalent there or or modification thereof, for bending straight bars of iron into cranks by the simultaneous action of blocks and dies actuated by screws or otherwise.

53,243.—Binder Guides for Sewing Machine.—Thomas Rogers, Liverpool, England:

First, I claim hinging the upper plate, B, to the lower plate, Q, and operating the upper plate, B, to bring it near to or away from the lower plate by means of a spring and a thumb screw and screw threaded pin, for the purpose of adjusting the distance apart of the guides, D F, substantially as shown.

Second. In combination with the above, I claim the tension bar, V V, constructed and operating in the manner and for the purpose explained.

Third, In combination with the binder, constructed as herein described. I claim the guides. D and F, attached to and arranged to slide back and forth for adjustment in separate plates, B and Q, as described.

53,244.—Composition for Cleaning and Scouring Textile Fabrics.—Gustave Emile Rolland and Emile Leon Rolland, Paris, France:

I claim as a new article of manufacture the improved liquid composition for cleansing, scouring, and bleaching textile, animal, mineral and vegetable substances, composed of the ingredients, and prepared in the manner herein described.

53,245.—Dental Drill.—Philo Soper, London, Canada.

First, I claim the combination of a spring power substantially such as herein described, with the spindle, b, and tool holder, o, constructed and operating as and for the purpose set forth.

Second, The universal joint, n, in combination with the spindle, b, tool holder, o, and with a suitable spring power, constructed and operating substantially as and for the purpose described.

Third, The arrangement of two or more bearings, r r', in the end of the conical box to operate in combination with the spindle, b, and tool holder, o, substantially as and for the purpose set forth.

53,246.—Telegraph Insulator.—William W. Smith, Cincinnati, Ohio:

First, I claim the reflexed or cup-formed insulating block, B, enclosed in a chamber, C, of post or projection therefrom.

Second, In the described combination with the above, the perforated cap or annulus, F f.

53,247.—Process for Disintegrating Fibers.—Charles Heaton, New York City:

First, I claim the above-described process of converting vegetable fibrous material into pulp, by first applying to the material a caustic alkaline solution or a solution in which caustic alkaline properties predominate, in order to prepare the material to be acted upon mechanically, and then reducing such material, so prepared, to pulp, by mechanical action, or its equivalent, substantially in the manner set forth.

Second, The process of treating crude vegetable fibrous material by a caustic alkaline solution, or a solution in which caustic alkaline properties predominate, when such treating is not for the purpose of reducing the material to pulp by dissolving its gummy portions, but it is for the purpose of simply softening the material.

Third, The process of subjecting vegetable fibrous material to mechanical pressure, for the purpose of reducing or disintegrating such material, when it has previously been treated with a caustic alkaline solution, or with a solution in which caustic alkaline properties predominate, substantially in the manner described, whether the material is afterwards further reduced or not.

Fourth, The process of making coarse paper from vegetable fibrous productions by separating the fibers without dissolving or removing the gums so that the gums shall enter into and form a part of the paper, substantially as set forth.

53,248.—Process for Disintegrating Fibers.—Charles Heaton, New York City:

First, I claim the process of reducing fibrous material to pulp by means of mechanical pressure, instead of reducing such material to pulp by the action of chemical agents, whether such agents are or are not used in connection with heat.

Second. The process of subjecting pulp, or vegetable fibrous matter which has been imperfectly reduced to pulp, to mechanical pressure for the purpose of further reducing undisintegrated portions of the same.

53,249.—Manufacture of Dry Caramel.—Thaddeus Hyatt, Philadelphia, Pa.:

I claim as a new manufacture, dry caramel, substantially as and for the purpose herein described.

53,250.—Preparation of Coffee.—Thaddeus Hyatt, Philadelphia, Pa.:

I claim, as a new manufacture, oil-developed coffee, substantially as and for the purposes herein described.

53,251.—Attaching and Hinging Covers to Stoves, Tea-Kettles, Etc.—Dennis G. Littlefield, Albany, N. Y.:

I claim the use of a cylindrical-keyed pivot pin, in combination with a circular notched aperture for the purpose of hinging and securing swinging covers upon stoves, tea-kettles, or similar open-topped vessels, substantially in the manner herein set forth.

REISSUES.

2,191.—Machine for Making India-rubber Hose, Belting, Etc.—James Bennett Forsyth, assignee by mesne assignment of himself, Roxbury, Mass. Patented Sept. 13, 1864:

I claim a machine for making hose, round packing cord, wringer rolls, tubing and similar articles of rubber or other similar material, rubber cloth or rubber and cloth, consisting essentially of the rolls, D E and M, and operating substantially as described.

2,192.—Combined Hay Spreader and Elevator.—Thomas C. Craven, Albany, N. Y., and William H. Davis, New York City, assignees of Thomas C. Craven. Patented Dec. 19, 1865:

I claim the elevating chute in combination with the raking cylinder deriving motion from the supporting and driving wheels, substantially as and for the purpose specified.

And I also claim the rotating cylinder deriving motion from the driving and supporting wheels, in combination with the movable teeth projected and withdrawn by an eccentric or equivalent means, substantially as described and for the purpose set forth.

2,193.—Power Loom.—Christopher Duckworth, Mount Carmel, Conn. Patented June 28, 1859. Reissued July 4, 1865:

I claim the combination of a reversible ratchet mechanism with the reversible revolving tappets used in the loom to move the shuttle boxes in a vertical direction, substantially as and for the purpose described.

Also, the combination of the pattern mechanism of the loom with a reversible ratchet mechanism, and the reversible revolving tappets, substantially as and for the purpose described.

2,194.—Power Loom.—Christopher Duckworth, Mount Carmel, Conn. Patented June 28, 1853. Reissued July 4, 1865:

First. I claim giving an alternate movement to the shuttle boxes in a horizontal plane by means of pawls, reversible tappets, and a contrivance which will automatically control the movements of said pawls, substantially as described.

Second, Giving an alternate diagonal movement to the shuttle boxes by means of pawls, reversible tappets, and a contrivance which will automatically control the movements of said pawls, substantially as described.

Third, The combination of reversible tappets with shuttle boxes, which are so applied to the loom that they will admit of being moved, either laterally, vertically or diagonally, substantially as described.

Fourth, Giving an intermittent, oscillating or rotary movement to a shuttle box actuated by means of pawls and ratchet wheels, which are controlled by a cam surface, t, or its equivalent, substantially as described.

Fifth, The use of tappets which receive a forward and backward movement or a continuous rotary movement in combination with many-chambered shuttle boxes at both ends of the lathe, which boxes are connected together by a lever, G', and operated simultaneously by means of said tappets, substantially as described.

Sixth, Giving a reciprocating movement to many-chambered shuttle boxes of looms by means of contrivances which are controlled, automatically, in such manner that the boxes are moved a greater or less distance by a single vibration of the lathe, so as to throw the shuttles in regular order, or to skip a shuttle according to the figure which it is desired to weave, substantially as described.

2,195.—Composition of Matter for Printer's Inking Rollers and for other purposes.—Lewis Francis and Cyrus H. Loutrel, New York City, assignees of Lewis Francis. Patented March 8, 1864. Reissued Sept. 27, 1864. Reissued Feb. 28, 1865:

I claim combining an alkali or alkalies, or alkaline earths, or any of the compounds of alkalies or alkaline earths, with glue and glycerin to form a new and useful composition of matter for various purposes.

2,196.—Nozzle.—Charles Oyston, Little Falls, N. Y. Patented Aug. 25, 1863:

I claim the combination of the dividers or divergers, substantially as described with a water nozzle.

And I also claim making the dividers or spreaders movable on the pipe, substantially as and for the purpose specified.

2,197.—Breech loading Fire-arm.—H. O. Peabody, Boston, Mass. Patented July 22, 1862:

First, I claim the combination of a swinging breech block, D, hinged at the rear end, with the trigger guard lever, E, by means of a pin and slot connection operating substantially as described, for the purpose specified.

Second, The combination of a swinging breech block, D, hinged at the rear end with the retractor, F, for the purpose of ejecting the discharged cartridge case by a continued movement of the guard lever in the same direction which it makes to bring the piece to the position for loading substantially as described.

Third, Holding the breech piece at its respective positions for loading and firing by the use of the notches, j and l, in combination with the spring, G, and roller, i, operating in the manner substantially as described.

Fourth, Causing the swinging breech block, D, when in the manipulation of the arm it has been made to operate upon the retractor, F, to eject the cartridge shell to be returned to such position that its top surface, k, shall coincide with the surface of the bore of the chamber for the purpose of facilitating the introduction of a fresh cartridge by the means substantially as described.

2,198.—Enlarging Photographs.—David Shive, Philadelphia, Pa. Patented March 22, 1859:

First, I claim a photographic solar camera swiveled or otherwise jointed so as to permit the axis of the lenses to be adjusted in horizontal and vertical planes in conformity with or approximation to the apparent direction of the sun's rays, for the purpose specified.

Second, I claim a photographic solar camera provided with a condensing lens, F, a negative holder, a magnifying lens or combination of lenses and a paper holder, C, the described portions of the apparatus so arranged having an adjustability in reference to each other, and the apparatus itself being adapted for the direct presentation of the condensing lens to the suns rays, whereby the axes of the lenses made approximately or truly conformable to the direction of the said rays.

2,199.—Portfolio.—Henry T. Sisson, Providence, R. I. Patented April 5, 1859:

I claim a holder, A, provided with curved paper file hooks, b b, and a hinged spring folder, B, or their equivalents in combination arranged and operating substantially as described for the purposes specified.

I also claim in combination with the folder, B, a spring latch, f and stop, g, substantially as described.

2,200.—Running Gear of Street Locomotives.—Ira C. Story and George W. Skaats, Cincinnati, Ohio, assignees Ira C. Story. Patented Nov. 21, 1865:

First, I claim the combination of one or more friction rollers or wheels, with the driving wheel or wheels of locomotives or land carriages, for the purpose of propelling said carriages

Second, The adjustable platform in combination with the friction wheels, O and N, and the driving wheel, C, substantially as described

Third, Reserving the movements of a locomotive by the alternate application to the drivers of friction rollers revolving in opposite directions.

2,201.—Sash Stopper and Lock.—Washington Van Gaasbeek, Mount Vernon, N. Y. Patented Oct. 4, 1864:

First. I claim the retaining lever, C, reaching beyond the sash, provided at its outer end with a spur, c, arranged to bite upon the outer face of the sash, in the manner substantially as set forth for the purpose specified.

Second. In combination with the above, I claim the inner spur or biting edge, b, substantially as set forth for the purpose specified

22,02.—Machinery for Cleaning Top-flats of Carding Engines.—Horace Woodman, Biddeford, Maine. Patented July, 8, 1856:

First, I claim a recess connecting shaft, H', so disposed in relation to the cleansing frame arms, a a', as to be carried by or to traverse with them, when said shaft is used in combination with mechanism operating in connection with said arms which produces by means of or through the said shaft, so disposed conjoint or uniform intermittent reciprocating traversing movements of the two sides of the cleansing frame, substantially in the manner and for the purposes set forth and specified.

Second, A traversing mechanism proper, substantially such as described, and a cleansing mechanism proper substantially such as described, combined in the manner and for the purposes set forth and described.

Third, A traversing mechanism proper, substantially such as described, a cleansing mechanism proper, substantially such as described, and a locking mechanism, proper, substantially such as described, combined in the manner and for the purpose specified.

Fourth, A detent or locking mechanism constructed substantially in the manner and for the purpose shown.

Fifth, The combination of a traversing mechanism, cleansing mechanism and detent or locking mechanism, with a pulley, P', located on a line with the axis of the main cylinder of the carding engine, so that the whole stripping mechanism may be actuated or driven by a single belt acting on the said pulley, substantially as and for the purposes set forth and described.

Sixth, A brush bar V, and waste pan, F, disposed in the upper part of the cleansing frame and carried thereby in combination with a so disposed or arranged in reference to the said brush bar as to remove the waste from the same, or cleanse the card of said bar prior or preparatory to the cleansing of each top card, substantially in the manner and for the purposes specified.

Seventh, In combination, the lever, O, dogs, M M', rod, q, and sliding clutch, N, arranged and operating to reverse the motion of the cleansing frame, substantially as and for the purposes specified.

Eighth, The grooves across the teeth connecting the space or slots between the teeth of the toothed rack, in combination with with such teeth whereby the series of top cards being cleansed is changed, substantially as and for the purposes set forth and described.

2,203.—Scroll Sawing Machine.—Lysander Wright, and Charles B. Smith (assignees Lysander Wright), Newark, N. J. Patented May 16, 1865:

First, I claim the vibration-weighted lever, A, or its equivalent, constructed and operating substantially as and for the purposes specified.

Second The combination of the pulleys, C C, and strap, D, with the saw-hook, E', and vibrative-weighted lever, A, substantially as and for the purposes specified.

Third. The connecting rod, D', in combination with the saw hook, E', and vibrative-weighted lever, A, operating substantially as and for the purposes set forth.

2,204.—Hollow Augers.—Arcalous Wyckoff, Elmira, N. Y. Patented July 12, 1859:

First, I claim in an annular auger in combination with a prime cutter, a, a transverse auxiliary cutter, b, carried back to the extremity of the stock either longitudinally with the auger or obliquely toward the heel of the next preceding cutter.

Second, In combination with the spiral flange, B, I claim beveling to a thin edge, the cylinder at d, in front of the base of the prime cutter for the purpose of giving an outward direction to, and carrying away the cuttings, substantially as set forth.

DESIGNS.

2,278 and 2,279—Bedsteads.—P. C. Cambridge, Jr., Enfield, N. H. Two Patents.

2,280.—Trade Mark.—A. W. Fagin, St. Louis, Mo.

2,281.—Tap-plate of a Watch.—F. A. Giles, New York City.

2,282.—Portable Furnace.—John Martin, Jacob Beesley and John Currie (assignors to Stuart and Peterson), Philadelphia, Pa.

2,283.—Hinge Plate.—Samuel M. Richardson, New York City.

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IRON CASTINGS AND STEAM BOILERS.—THE HINKLEY AND WILLIAMS WORKS, No. 416 Harrison avenue, Boston, are prepared to manufacture common and gun-metal castings, of from ten to thirty pounds weight, made in green sand, dry sand or loam, as desired; also Flue and Tubular Boilers, and "Hinkley's Patent Boiler," for locomotive or stationary engines, warranted to save a large percentage of fuel over any boiler now in use. 13 -6

TO INVENTORS.—R. L. DELISSER, No. 69 BEAVER street, N. Y., gives especial attention to introducing to public notice and disposing of good Patents. 13 2*

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RESULT OF THE VAN DE WATER CHALLENGE. —MESSRS. EDITORS:—The readers of your valuable paper will recollect that in your issue of Nov. 11, 1865, Mr. Van De Water challenged any water-wheel builder to compete with his make of wheel for $500. In your issue of Dec. 9, 1865, I accepted his challenge, and named $5000 as the competing sum, and appointed Fairmount Water Works, Philadelphia, Pa., as the place of trial, where not only the relative merits but the actual percentage of each wheel (large or small) would be made known to the public.

Mr. Van De Water evaded this by proposing the test should be made in Rochester, N. Y. I had some thirty of my wheels at work in Rochester—one of them in G. W. Burbank's mill, that had been running three and a half years, which had three or four buckets knocked out. Mr. Van De Water put one of his wheels in the same mill, and by running against my wheel in that condition, deluded himself into the belief that his wheel was equal to mine. Hence the challenge. I replaced my wheel in Burbank's mill with one that was in order. Without my knowledge a test was recently made; for the result I refer you to the article below, signed by six responsible millers and mill owners of Rochester. This, Messrs. Editors, we suppose is the reason Mr. Van De Water evades the test, after having made a public challenge. JAS. LEFFEL & CO.,
Springfield, Ohio, March 6, 1866. for Jas. Leffel.

ROCHESTER, N. Y., Feb. 28, 1866.

We, the undersigned millers, of the City of Rochester, N. Y., saw at the Crescent Mills, owned by G. W. Burbank, a practical test of the capacity for grinding wheat, of the Van De Water wheel (36 inches in diameter), and the "Leffel Double Turbine" wheel, (35 inches in diameter.)

The amount ground by the Leffel wheel exceeded that of the Van De Water wheel by twenty-four (24) barrels of flour in twenty-four hours.

The two wheels are in the same flume, and this is as fair a trial as can be made, in our opinion, without measuring the water. We consider the Leffel Double Turbine Water-wheel to be the best wheel in existence.

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G. W. BURBANK, Crescent Mills.
13 4 JAS. WILSON, Model Mills.

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THE UNDERSIGNED, HAVING FACILITIES FOR manufacturing articles of a light nature, either in iron and brass, or both (requiring slide lathe work), would like to engage with or for any party or parties in any staple article that would meet with a ready sale. Address STURGES & FROST,
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TO PARTIES WISHING TO INVEST IN A GOOD MANUFACTURING BUSINESS.—We now offer for sale a complete set of Wheel Machinery and Fixtures, consisting of five Spoke Lathes, Blanchard's patent; two Polishing Machines, one for coarse and one for fine polishing; Threating, Facing and Sizing Machines; one Dennistown Rim Rounder; one Hub Mortiser, Fay's patent, manufactured by C. B. Rogers & Co., of Norwich, Conn.; one Turning Lathe, ten feet long; a set of Jacobs's Patent Wheel Machinery, complete; also Circular Saws and Tables, one-belt Scroll Saws, one Scroll Saw and one Spoke Tenoning Machine, both manufactured by J. A. Fay & Co., of Cincinnati; Shafting, Pulleys, Belting, Hangers, etc., and all the machinery and fixtures requisite for a wheel manufactory. The above machines have been in use about one year, and can be seen, in perfect running order, at our factory. Any parties wishing to continue the business can make arrangements to do so without being at the additional expense of fitting up a factory elsewhere, as the rooms now occupied by us are to rent from May 1, with power. This is a good investment for a party acquainted with the business. For further particulars call at our office and manufactory. JACOBS WHEEL COMPANY,
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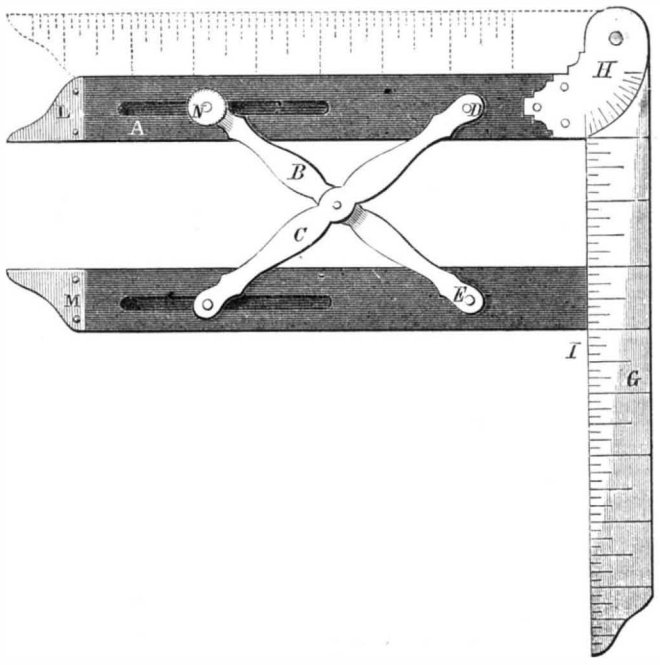
Improved Parallel Ruler.

The instrument herewith illustrated combines within itself an improved parallel ruler, square, quadrant, calipers, and compasses. Its operation will be readily understood from the illustration.

The slots, A, in the parallel arms of the rulers are beveled out on the under side to receive the heads of the pins which pass through them from the cross arms, B C. As the arms, B C, are opened and shut, the pins traverse in the slots. These being on a line with the other joints, D E, and parallel to the edge of the ruler, the latter are always held exactly parallel to each other. A scale, G, is hinged to the shank, H, in such a manner that when brought down against the ends of the arms of the ruler, as shown, a right angle is formed at I; and when not in use it can be folded back, as shown by the dotted lines. To the ends of the arms hardened metallic points, L M, are attached for the purpose of using the instrument as calipers, trammels, and compasses; and when so used the thumb screw, N, is designed to secure the arms in any desired position.

The parallel ruler in common use, with mathematical instruments, works off diagonally across the page, and away from the work of the operator. This moves perpendicularly up and down the page to any distance. A ruler of any given length, constructed in this manner, will spread to a greater distance than one as ordinarily made, thus avoiding the necessity of frequently moving the lower limb while operating with it. When the scale, G, is in the position shown, a convenient rule is always at hand, enabling the operator to draw his parallel lines at any given distance apart, without the necessity of using any other instrument to measure with. With the scale set as shown, a right angle is formed at I, in which position it may be used by the mechanic as a square, and by the mathematician to erect perpendiculars, or cut lines at right angles. By graduating the shank, J, the more usual angles may be laid off as with a quadrant. When used as calipers and dividers, the scale, K, always shows the distance of the points from each other.

A patent for this invention was granted to Uriah Smith, Battle Creek, Mich., Jan. 29, 1866. The inventor, not being a manufacturer, would be glad to correspond with any interested parties in reference to the privilege of manufacture, or the sale of the entire right. For further information address as above.



SMITH'S PARALLEL RULER.

Printing Rollers.

Printing rollers are made of a mixture of glue and treacle, or of glue and honey. 1 pound of good glue is softened by soaking in cold water for twelve hours, and then it is united, by means of heat, with about 2 pounds of ordinary treacle.

Messrs. Hoe & Co. give the following directions for making and preserving composition rollers:—For cylinder-press rollers, Cooper's No. 1. × glue is sufficient for ordinary purposes, and will be found to make as durable rollers as higher priced glues.

Place the glue in a bucket or pan, and cover it with water; let it stand half an hour or until about half penetrated with water (care should be used not to let it soak too long), then pour it off, and let it remain until it is soft. Put it in the kettle and cook it until it is thoroughly melted. If too thick, add a little water until it becomes of proper consistency. The molasses may then be added, and well mixed with the glue by frequent stirring. When properly prepared, the composition does not require boiling more than an hour. Too much boiling candies the molasses, and the roller consequently will be found to lose its suction much sooner. In proportioning the material, much depends upon the weather and temperature of the place in which the rollers are to be used. 8 pounds of glue to 1 gallon of sugar-house molasses, or sirup, is a very good proportion for summer, and 4 lbs. of glue to 1 gallon of molasses for winter use.

Hand-press rollers may be made of Cooper's No. 1¼ glue, using more molasses, as they are not subject to so much hard usage as cylinder-press rollers, and do not require to be as strong; for the more molasses that can be used the better is the roller. Before pouring a roller, the mold should be perfectly clean, and well oiled with a swab, but not to excess.

Rollers should not be washed immediately after use, but should be put away with the ink on them, as it protects the surface from the action of the air. When washed and exposed to the atmosphere for any length of time, they become dry and skinny. They should be washed about half an hour before using them. In cleaning a new roller, a little oil rubbed over it will loosen the ink, and it should be scraped with the back of a case knife. It should be cleaned in this way for about one week, when lye may be used. New rollers are often spoiled by washing them too soon with lye. Camphene may be substituted for oil; but owing to its combustible nature it is objectionable, as accidents may arise from its use.

New Photographic Printing Process.

We have received from the inventors, Messrs. G. E. Desbrats and W. A. Leggo, of Quebec, C. E., some specimens of prints—done upon a common hand-printing press—of their newly patented process for making printing plates by means of the photograph.

The object of the patentees is to produce electrotype plates of pictures, ready for common printing, like ordinary type printing, without engraving or other hand work.

The process is briefly as follows:—Upon the varnished side of an ordinary negative, pour a solution of gelatin containing bichromate of potash. Dry, and expose the uncoated surface uppermost to light, which fixes that portion of the bichromate upon which the rays fall. Dissolve off the unfixed portion by dipping in warm water; drain, and we have a film upon the glass more or less raised, according to the strength of the lights in the picture. Take an impression of this film in plaster. Dip the impressed plaster in hot wax, and place the waxed surface upon a glass plate also covered with hot wax. The wax upon the plate unites with the wax upon the plaster, and the latter may then be removed, leaving upon the plate a fac simile in wax of the original photographic gelatin film.

The fac simile being now dusted with plumbago and electrotyped in the usual manner, a printing block in copper is produced, capable of use with printer's ink upon any press.

The specimens we have received are for the most part copies of steel plate engravings, and the pictures are comparatively well done. There is, however, room for improvement.

Crosshead Guides.—Messrs. Chaplin employ for their contractors' engines, and for their engines or their steam cranes, a very simple form of crosshead guide. The guide bars are cast in one piece, with the front cylinder cover, and are finished by boring them out with a cutter fixed to a boring bar passing through the piston rod stuffing box, and the ring by which the outer ends of the guide bars are connected. The surfaces of the bars thus made sufficiently hollow to retain the crosshead in its place. Guide bars should always be furnished with good means of lubrication, and the ends of the crosshead blocks should be rounded off with a very small radius, so that they may not scrape the oil from the bars as they work to and fro.—*English Trade Circular.*

[This is not new either, as the same plan is practised in some engines made at the New York Steam Engine Works.—Eds.

Bursting of a Blast Furnace.—An explosion lately occurred at the blast furnaces of J. P. Hickman, Graveland Ironworks, Tividale, near Dudley, Eng. A furnace was about to be tapped, when one of the tweers through which the blast is conveyed into the molten metal burst, and the water which is contained in the tweers to keep them from melting, at once bursting into steam forced out a quantity of the melted iron upon the men employed at the furnace. Two men were so dreadfully burnt that they died the next morning, and two more received very serious injuries.

How to Purify Rancid Lard.—A correspondent of the *Country Gentleman* writes: 'We had some forty pounds rancid lard, which was valueless as it was. Knowing the antiseptic qualities of the chloride of soda, I procured three ounces, which was poured into about a pailful of soft water, and when hot, the lard added. After boiling thoroughly together for an hour or two it was set aside to cool. The lard was taken off when nearly cold, and it was subsequently boiled up. The color was restored to an alabaster white, and the lard was as sweet as a rose."

Strength of Ice.—As people are a little timid about traveling on the ice at times, we give the capacity of the ice as furnished by the U. S. Ordnance Department which is correct. Ice two inches thick will bear infantry; four inches, cavalry with light guns; six inches, heavy field guns; and eight inches, the heaviest siege guns with 1,000 pounds weight to a square inch.

MECHANICS

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